

# Psychosocial Work Environment Stress and the Incidence of Cardiovascular Diseases

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## Abstract

**Aim:** A literature review to study the relationship between psychosocial work environment stress and the incidence of cardiovascular diseases in Europe.

**Background:** Psychosocial work environment can be defined as the interpersonal and social interactions that affect behavior and development in the workplace. It is known that work-related stress is very common and it has a high cost on employers' health. In the longer term, stress can lead to different diseases, such as hypertension, which is a risk factor of cardiovascular diseases (CVDs). CVDs are a group of disorders of the heart and blood vessels. CVDs are the main cause of death globally. In 2015, around 17.7 million people died from CVDs worldwide, representing 31% of all deaths.

**Keywords:** Cardiovascular diseases; Workplace; Europe; Cohort studies; Psychosocial

## Introduction

In Europe, stress at work is the second most frequently reported health problem; representing 50-60% of all lost working days. CVD causes over 4.3 million deaths in Europe and over 2.0 million deaths in the EU each year. CVD is the main cause of death in women in Europe and is the main cause of death in men in all countries except France, the Netherlands and Spain [1-4].

For many decades, several studies have been conducted to examine the association between adverse working conditions and CVDs. However, the mechanisms how work stress leads to CVDS are still unclear.

Since the mid-1990s, two theoretical models to assess the work stressors have been developed: The demand-control or job strain model (JDC) and Effort-Reward Imbalance (ERI) model [5].

The JDC model is focused on the hypothesis that a gap between low control over working circumstances and high demand in terms of workload is particularly risky to health, while high control and low demand give the most health benefits. Four categories are obtained: active jobs (high demands, high control), passive jobs (low demands, low control), high strain (high demands, low control) and low strain (low demands, high control). Social support has been added to the model, to generate "Isostrain": High strain and lack of social support, which has the highest health risk [5].

Moreover, ERI model focuses on the imbalance between effort and reward, as a source of stress at the workplace. Regarding this model, rewards such as wages, esteem and promotions will reduce the negative effects of the spent physical and mental efforts [5].

## Method

A literature review was performed by using two databases: PubMed and Scopus (Table 1).

## Method of empirical work

A validated questionnaire has been designed to investigate the relationship between psychosocial work environment and the risk factors affecting the CVDs, based on the JDC Model and Karasek model to measure the job control, job demand, social support and the

PubMed	Scopus
Mesh terms used in the first search: ("Cardiovascular Diseases"[Mesh] and "Workplace"[Mesh]) AND "Europe"[Mesh] "Cohort Studies"[Mesh] psychosocial 15 results were found=> limited to English=>15 results. Afterwards, the 15 articles were reviewed on the basis of the predetermined inclusion and exclusion criteria, 6 relevant articles were found.	Key words used: ("cardiovascular diseases" "cohort studies" psychosocial and workplace) and exclude ("review")) and (limit-to European countries and (limit-to (language," English"))) => 9 documents=> after manual searches of the articles => 2 relevant articles.
Inclusion Criteria	Exclusion Criteria
<ul style="list-style-type: none"> <li>English only.</li> <li>European countries.</li> <li>Access to free articles</li> <li>No gender limitation.</li> <li>Different occupations</li> <li>Cohort study</li> </ul>	<ul style="list-style-type: none"> <li>Previous CVD at baseline</li> <li>Not relevant articles</li> <li>Less than 1000 individuals.</li> <li>Review articles</li> <li>Not relevant to our aim</li> <li>Cross-sectional study</li> <li>Case control study</li> <li>Meta-analysis</li> </ul>

Table 1: Review from PubMed and Scopus.

ERI model. Additionally, it included two questions related to presence of CVD and CVD risk factors.

Face to face interviews and telephone interviews were done to accomplish the survey. Total number of participants was 10 from different occupations.

## Results

Five out of the eight articles were randomly selected, due to the limited resources of time and people.

The results from the selected five papers and the empirical work are detailed in Table 2.

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Author(s)	Objective	Sample/Age group	Design	Results	Conclusion
Szerencsi et al. [6]	To analyze the association between work stressors and cardiovascular disease, using (MCS-WSS)	11,489 Netherlands employees, including men and woman. Age group: 18-65 years old.	Prospective cohort study.	During a median follow-up of 49 months, 309 employees developed incident CVD: 152 MIs, 143 strokes and 14 employees developed both stroke and MI.	High exposure to work stressors has no considerable impact on cardiovascular disease.
Kivimaki, et al. [7]	To examine justice at work as a predictor of coronary hearts disease (CHD) based on JDC and ERI.	6442 British men, aged 35-55 years	Prospective cohort study	High level of justice at work has a lower risk of incident CHD. 250 employees had an incident CHD event during the mean follow-up of 8.7 years.	Justice at work may have benefits for heart health among employees.
Schioler et al. [8]	To investigate psychosocial stressors were associated with increased risks of IS and CHD, based on JDC.	75,236 Swedish male construction workers.	Prospective longitudinal study.	1884 cases of CHD and 739 cases of IS were reported. No significant trend was seen for demand, control or support in relation to IS. A significant trend was seen for higher control as a protective for CHD. No trend or demand/support for CHD.	No significant associations between the psychosocial work environment and IS were shown and the associations between JDC and CHD were inconsistent and weak.
Dirk De Bacquer et al.[9]	To examine the independent role of perceived job stress on the short-term incidence of clinically manifest coronary events, based on JDC	14,337 Belgian males Age group: 35-59 years	Prospective cohort study.	During the 3-year follow-up, 87 CHD were registered, 20 cases of fatal MI. According JCD, 26% experienced low strain, while 17% were classified as high-strained. 11% experienced "Isostrain". Men exposed to low social support had a substantially and significantly elevated risk to develop CHD.	No strong or consistent evidence for JDC as predictors of CHD was found. The study demonstrated the major importance of social support at workplace, in the prevention of CHD.
Bonde et al. [10]	To analyze the association between psychosocial workload and risk of CVD using COPQES, Karasek's and Theorell's job strain model and job satisfaction	18,258 Danish public service workers. Men and women: 79% were women. Age: 41 to 60 years old.	Cohort study	During 87,428 person-years at risk (mean follow-up 4.82 years)101 subjects were admitted to a hospital due to IHD. Neither job strain nor general job dissatisfaction were related to IHD risk. Subjects who were allocated to the low job control category, had an increased risk of IHD	The findings presented do not lend support to the hypothesis that high job strain and job dissatisfaction are important determinants for IHD among Danish predominantly female public service workers.
<b>Empirical Work</b> E.B. I.I. K.M.N.B L.R.C. M.O.A.	To investigate the relationship between psychosocial work environment and the risk factors affecting the CVDs.	10 participants, working in Sweden, both men and women. Different occupations.	Questionnaire based on JDC and ERI. (Pilot Study)	-69% employees think they have moderate to high job demand. -37% employees think they have moderate to low job control -30% employees think they have moderate to low SS. -only 36% employees believe that they have high ERI.	Interviews results and analysis shows that all participants have not CVD lead to work, despite presence of some risk factors like stress and high cholesterol.
MI: Myocardial Infarction. MSC-WSS: Maastricht Cohort Study Work Stressor Score. CHD: Cardiovascular Heart Disease. SS: Social Support. IHD: Ischemic Heart Disease. COPQES: Copenhagen Psychosocial Questionnaire, JDC: Job-Demand Control, ERI: Effort-Reward Imbalance model.					

**Table 2:** The results from the selected five papers and the empirical work.

## Discussion

This literature review describes five cohort studies; samples of these articles contain people of different age groups, three of these articles include only men and two of them both genders, only one study includes homogeneous population of employees.

The studies investigate the correlation between psychosocial work factors and different CVDs (IHD, MI, angina pectoris, Stroke, CHD). Studies measure workplace psychosocial factors by adjusting other conventional risk factors of CVDs; such as age, education, cholesterol level, BMI, blood pressure, ethnicity, physical activity, smoking and alcohol consumption.

Dirk De Bacquer, et al. [6] also examined the role of the CVD risk factors at workplace independently from other risk factors.

There is a trend in introducing new conceptual models to measure the relationship between psychosocial work environment and CVD. Kivimaki et al. [7] was the first study to examine the relation between justice at work and the incidence of new CHD among participants and this correlation was independent of other CVD risk factors. Also, Bonde et al. [8] which measured the correlation between psychosocial work environment and CVDs by adding another dimension (job satisfaction) based on JDC model. Szerencsi et al. [9] examines the link between work stressors and CVDs, using the MCS-WSS, a comprehensive approach which has been related with work strain.

Four out of five articles concluded there is no significant association between psychosocial work environment and CVDs, however, Schioler et al. [10] has shown significant trends for higher control as a protective for CHD, and Dirk De Bacquer et al. [6] has displayed that workers exposed to low social support had a substantially elevated risk to develop CHD. Only one study found that justice was associated with a lower risk of incident CHD than low and intermediate justice, before and after adjustment of CVD risk factors [7].

There might be limitations within the tools used to measure stressful work environment. Those models are criticized of not being comprehensive enough to assess stress at work [9]. Some studies used modified versions of models to measure psychosocial work environment, by adding other dimensions such as: Justice, job satisfaction, role clarity, career possibilities, working overtime, job insecurity [7-9]. They use self-reported questionnaires that measure the perceived psychosocial stress factors. Another aspect could be the heterogeneous population of employees, the level of work stressor might be higher in some occupations such as nurses and law enforcement officers.

The performed pilot empirical work shows no correlation between psychosocial work environment and CVDs. This conclusion might be related to limited time, small sample size, people with specific occupations such as nurses, refused to get interviewed due to lack of time and high levels of stress in the work environment. Another aspect is the absence of follow up programs for interviewees. The interview

included two questions about CVD and its risk factors, medical examination was not accessible.

## Conclusion

Most of the articles showed no significant correlation between psychosocial work environment and CVDs. More studies are needed to investigate this relationship by using more effective instruments to measure stress at the workplace. In addition, studies are recommended to be done in homogeneous population of employees and to consider the difference in stress levels between different jobs.

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