

# **Work and Health**

## **Session # 10**

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## Why must some people sacrifice their health and well-being as a requirement of working?

- Widely acknowledged that manual work is monotonous, dirty and difficult!
- A price of subordination is the necessity of accepting danger, harm and even death is an unspoken but socially accepted norm.\* (standard, accepted)
- Dangers increase as one descends the social ladder worldwide.
- Offered solutions focus on individual

# Who is at greatest risk?

- Individuals in lower social class jobs
- Non-Caucasians
- Female Workers
- Some combination of the above

# New Work Stressors of the Middle classes

- White collar and executive work not immune from the issue of work stressors
- Long work hours, effort-reward imbalance, job insecurity, job dissatisfaction, lack of social support, emotional labor are all problems that cross class, race and gender boundaries.

# **Workplace Democracy – Gardell<sup>1</sup>**

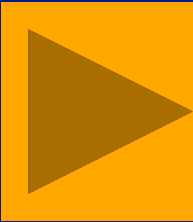
- **The view that scientific management and human relations were antagonistic ideas emerged around 1960.**
- **The less content work has – objectively – and the less the worker has control over planning and working methods, the less rewarding is the work situation and more work is experienced as constrained and meaningless.**
- **The main problem as seen by Gardell is not to state the requirements of a more humane work organization but to develop strategies for bringing such work into existence**
- **<sup>1</sup> Worker Participation and Autonomy: A Multilevel Approach to Democracy in the Workplace. Int. J. Health Services 1982**

# Democratic Work Organization

- **Employee influence at all levels of the company**
- **True autonomy at the production group level requires that employees have the right to co-determination when it comes to the more sweeping decisions made by the company**
- **Many obstacles to implementation of this strategy**

# Collective response

- Given the inability of individuals to change their work situations the alternative is some form of collective response.
- More evident among blue collar workers than white collar
- Less evident worldwide than in Western European countries (long history of dealing with capitalism)



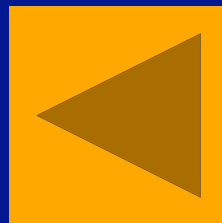
# Almex

- **Preceded Act of Co-determination by several years**
- **Employee influence at all levels of company**
- **No distinction between work organization and personnel matters (why important?)**
  - **Avoids problem of recruiting employees with anti-worker biases**
- **Creation of autonomous group system**
- **Some assembly units completely managed by union members**



# Almex – Generalizability

- Customer-ordered production
- Low degree of mechanization
- Little dependency on time and motion studies
- Complex manual work
- Strong company position in international market



# Co-determination at Almex

- Co-determination takes 2 forms
  - Representative form – reflected in formal organizational bodies (board, etc)
  - Informal – contacts between union officials and management on a day to day basis.

# Act of Co-determination (Sweden 1977)

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- Law intended to promote agreement between employers and trade unions
- Opened up all areas of company life to trade union influence
- Covers personnel policy, work organization, and use of computers

# Government regulations in Sweden

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## SWEDISH WORK ENVIRONMENT ACT OF 1977

**Working conditions shall be adapted to people's differing physical & mental aptitudes.**

**The employee shall be given the opportunity of participating in the design of his own working situation & in processes of change and development affecting his own work.**

**Technology, work organization & job content shall be designed in such a way that the employee is not subjected to physical or mental strains which can lead to illness or accidents. Forms of remuneration & the distribution of working hours shall also be taken into account in this connection. Closely controlled or restricted work shall be avoided or limited.**

**Efforts shall be made to ensure that work provides opportunities of variety, social contact & co-operation, as well as coherence between different working operations.**

**Furthermore, efforts shall be made to ensure that working conditions provide opportunities for personal & vocational development, as well as for self-determination & professional responsibility.**

(amended may 30th 1991, chapter #2, section #1)

# Collective Bargaining

- What is it → a process of negotiations between employers and group of employees aimed at reaching agreements that regulate working conditions (wages, hours, organization, etc.)
- Began with trade unions in 19<sup>th</sup> Century
- In U.S., National Labor Relations Act (1935) covers most collective agreements in the private sector.
- Law makes it illegal for employers to discriminate, spy on, harass, or terminate the employment of workers because of their union membership.

# Collective bargaining (chapter 12, OM:STAR)

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- Many contracts mention limits to:
  - Chemical & physical hazards
  - Shiftwork
  - Overtime
- Increase income & promotion opportunities
- Secondary prevention: EAPs

# Collective bargaining (contracts as an intervention strategy)

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- To reduce or prevent psychosocial stressors:
  - Demands: staffing, work standards, quotas
  - Control over: hours, schedules (flex time), rest breaks, assignments, performance evaluation, technological change, harassment, discrimination, job security
  - Skill utilization: skills training, career development
  - Social support: reduce isolation, improve climate
- Processes:
  - seniority, grievance procedure
  - L-M committees (S&H, stress, work & family, new technology)
- New systems of work organization

# Governmental and regulatory efforts



# European Union directive on health & safety

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COUNCIL DIRECTIVE, 12 June 1989

The employer has a duty to ensure the health and safety of workers in every aspect related to the work, following the general principles of prevention: avoiding risks; evaluating the risks that cannot be avoided; combating the risks at the source; adapting the work to the individual, especially as regards the design of workplaces.... **with a view to alleviating monotonous work at a predetermined pace and to reducing their effects on health.**

# Efforts in the U.S. to regulate workplaces

# Emergence of Concept of Workers Compensation

- Common Law and the early industrial revolution
  - Contributory negligence (if the worker was in any way responsible, this doctrine held employer was not at fault)
  - The “fellow servant” rule – employers held not liable if workers injuries due in part to action or negligence of a fellow worker
  - The Assumption of risk – held that employees know of the hazard of a job by signing a contract. Therefore, by agreeing to work in a position they assume any inherent risk it carries.
  - Injured worker only recourse was through the use of torts which in the 19<sup>th</sup> Century were very expensive legal affairs

# Modern Workers Compensation

- Began in Germany by Chancellor, Otto von Bismarck. Effort to limit power of socialists and Marxists by passing legislation to protect workers and gain their loyalty.
- Implemented social insurance. Employers Liability Law of 1871. followed by Workers Accident Insurance in 1884.

# U.S. Workers Comp

- Upton Sinclair novel – The Jungle led to the Food and Drug Act of 1906 and the Meat Inspection Act of 1906.
- Federal efforts at legislation failed and issue left to the states.
- Acts passed in NY in 1898 and other states followed.

# Structure of U.S. Worker Compensation laws

- Central tenet is that of “no-fault” insurance
- Employers participating are exempt from tort legal action
- Plans are employer funded
- Claims handled by legislatively created state compensation boards
- Compensation is paid both in form of wage-replacement (for time of total disability) and in form of lump sum payments for residual permanent disability

# Workers' compensation for stress-related illnesses

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- Context: national effort in 1990s to reduce benefits and tighten eligibility standards
- More stringent criteria for psychiatric stress claims
  - California (1993):
    - No claim if >35% caused by “lawful, good faith personnel actions”
    - Higher threshold for compensability for “mental-mental” cases, but not for “mental-physical” cases
    - Burden of proof on worker that actual events of employment were “predominant” cause (>50%) of psychiatric injury
    - If cause of psychiatric injury is a violent act, actual events of employment were “substantial” cause (>35%) of injury
  - Similar changes in New York State

# Work organization: Govt regulations in U.S.

## Ergonomic regulations

- California

- “...employer shall consider engineering controls...and administrative controls, such as job rotation, work pacing or work breaks.”

- OSHA (1995)

- Mandatory portion: machine-paced work is a risk factor
- Appendices: detailed review of work organization improvements, e.g., job variety/rotation, schedules, recovery periods, self-pace, limit O/T, increase cycle time, adjust line speed, avoid piece-rate

- OSHA (2000) (rescinded 2001 by President Bush)

- Mentioned in tables listing specific working conditions: work recovery cycles, work rate, task variability
- Possible administrative controls: job rotation/enlargement, rest breaks, alternative tasks, adjust work pace, work methods redesign



# 1999 California law on nurse staffing levels

- Formal regulations released (9/29/02)
- Public hearings in LA (11/15), SF (11/19), Fresno (12/4)
- Proposed ratios (selected):

ICU/CCU/Neo-natal Intensive Care	1:2
Medical and Surgical (phase-in)	1:5
Initial ratio for first 12 to 18 months	1:6
Oncology/Specialty Care	1:5
Labor and Delivery	1:2
Pediatrics	1:4
Intermediate Care Nursery	1:4
Well Baby Nursery	1:8
Psychiatric/Behavioral Health	1:6

# **Bills to ban mandatory O/T among nurses**

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## **FEDERAL**

**S.1686/H.R.3238, both stalled on Capitol Hill.**

## **NEW JERSEY**

**S.122/A.2607**

**Gov. Christine Whitman (R) conditionally vetoed this bill in 2000. The governor said the legislation's failure to ban voluntary excessive overtime led her to conclude that no overtime should be banned at the current time.**

# New Jersey Bans Forced Overtime for Healthcare Workers

- March 1, 2004

- New Jersey became the second state in the nation to bar healthcare institutions from forcing healthcare workers to work involuntary overtime, except in emergencies.
- The law, which went into effect on Feb. 17, covers all hourly workers who provide patient care or clinical services in hospitals, nursing homes and home care agencies, including nurses, nurses' aides, pharmacists and therapists, **but not doctors.**

# **ECONOMIC LEGISLATION: INCENTIVES FOR LOWERING CARDIONOXIOUS EXPOSURES (AN EXAMPLE FOR THE U.S.)**

*We propose a tax be imposed on those industries with jobs that are especially prone to producing circulatory disease. Currently the costs of workplace induced CVD are transferred to society in the form of costs to Medicare and other insurance carriers - what is called a “negative externality”. The proceeds from this tax could be used to defray the costs currently being absorbed by Medicare and the Social Security Administration. This Circulatory Disease Tax Fund could be modeled after the **Black Lung Trust Fund that taxes coal companies on a per-ton-of-coal basis** and used the money to pay medical and indemnity benefits for persons with pneumoconiosis.*

*The Circulatory Disease Tax Fund will have two beneficial effects.*

**1) It will resolve the equity problem. Taxpayers should not have to pay for a problem they were not responsible for.**

**2) The tax will provide an economic incentive to businesses to decrease the causes of job related circulatory diseases. The tax will encourage businesses to re-assess their workplace arrangements to decrease Job Strain and other job-related causes of circulatory diseases.**

# Some Course Highlights

- What have we learned?
- What needs to be learned?
- What needs to be done!
- What can we do!?

# Impact of Globalization

- 1. A decline for many in autonomy and skill required for their jobs;
- 2. The outsourcing of labor to developing countries where the cost of labor is lower and the regulation of working conditions is minimal or nonexistent, with the consequence of a loss from the United States of high quality, well- paid blue-collar work and more recently information-processing service- sector work;
- 3. The “feminization” of the work force, particularly in low-income occupations, resulting in women being exposed disproportionately to noxious working conditions associated with low-paying jobs;

# Globalization cont:

- 4. Increases in over- and underemployment and employment insecurity in the United States accompanied by increases in temporary, part-time, and flexible labor (“precarious employment”);
- 5. A sharp increase in recent years in the gap in wealth and income levels between rich and poor.

# U.S Workforce

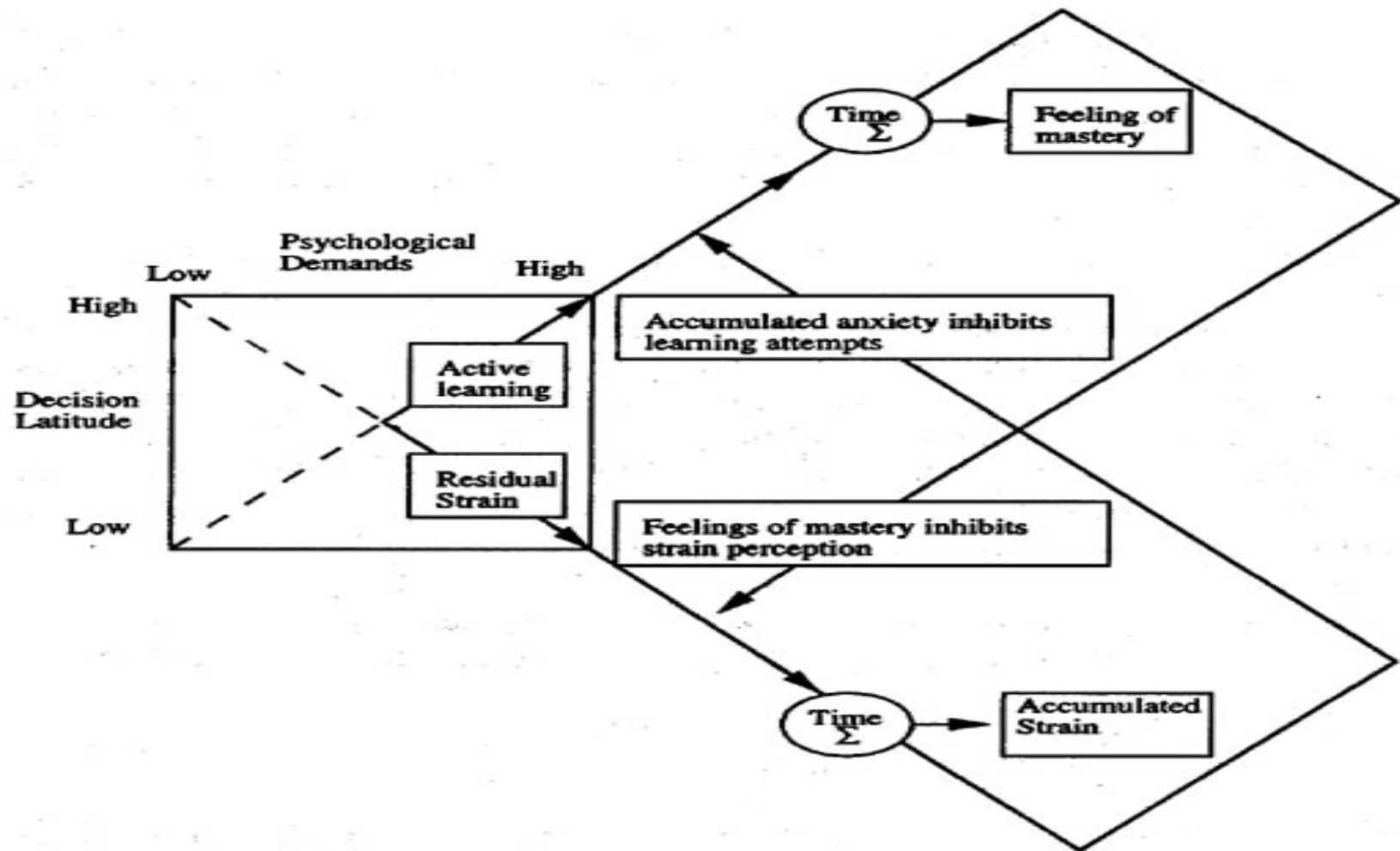
- An increasingly noxious and stressful workplace leading to a variety of mental and physical illnesses;
- An increasing tendency for work to invade private time with a blurring of work/family boundaries;
- Little or no increase in real income (after taking inflation into account) for most working people during the last 20 years;
- Increasing social inequality and poverty (for example, at least 20% of the U.S. population is without any health insurance) as more and more wealth is concentrated in the hands of fewer and fewer while more and more people come to occupy poorly paying and noxious jobs; and



# U.S Workplace cont.

- The imbalance of power between owners and workers is manifested in the fact that social policies are increasingly being influenced by special interest groups and corporations. Not only is there further degradation of work but there is also increasing corruption of our political system by corporate money, leading to weakened social protection and workers' rights, reduced legal rights to unionization, and lessened pension security, job safety and health, and access to health care.

# Dynamic Demand-Control Model



**Figure 4.2. Dynamic Demand-Control Model**

SOURCE: Karasek & Theorell, 1990, p. 99. Copyright © 1990 by Robert Karasek. Reprinted by permission of Basic Books, a subsidiary of Perseus Books Group, LLC.

# Typical occupations found in four quadrants of Karasek's job strain model (1969-1977 data)

*Psychological Job Demands*

		Low	High
<i>Job Decision Latitude</i>	High	Forester Repairman Dentist <b>Low Strain</b>	Banker Physician HS teacher <b>Active</b>
	Low	Janitor Watchman Billing Clerk <b>Passive</b>	Assembler Waiter Nurse aide <b>High Strain</b>

# The Importance of Psychosocial Factors in Hypertension - Findings from the Cornell U.M.C. Work Site Ambulatory Blood Pressure Project

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- **Case-Control Study – Job Strain and Hypertension – Odds Ratio = 2.7**
- **Cross-Sectional Study – Job Strain and Ambulatory SBP = + 6.6 mm Hg**
- **Job Strain and Ambulatory DBP = + 4.0 mm Hg**
- **Longitudinal Study – Repeated exposure Job Strain and AmSBP = +12 mm Hg**
- **Repeated exposure Job Strain and AmDBP = +9 mm Hg**
- **Population Attributable Risk % = 25%<sup>1</sup>**

# Studies of Job Strain and Coronary Heart Disease

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- 27 studies published between 1981 and 1999
  - 16 from Sweden (many using national data bases)
  - 7 from the U.S. (2 using national data bases)
  - Also from Czech republic, Denmark, England, Finland

	Significant positive associations	Mixed positive and null associations	Total # of studies
Cohort studies	6	5	13
Case-control studies	2	6	9
Cross-sectional studies	4	0	5

Sources: Belkić K, Landsbergis P, Schnall P, Baker D, Theorell T, Siegrist J, Peter R, Karasek R. Psychosocial factors: Review of the empirical data among men. *Occupational Medicine: State of the Art Reviews* 2000;15(1):24-46. Brisson C. Women, work, and CVD. *Occupational Medicine: State of the Art Reviews* 2000;15(1):49-57.

# Studies of Job Strain and Ambulatory Blood Pressure (updated 6/2006)

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	Significant positive <u>associations</u>	Mixed positive and null <u>associations</u>	Total # of <u>studies</u>
Ambulatory blood pressure	9	16	25
men	4	6	10
women	3	4	7
both	2	6	8

Belkić K, Landsbergis P, Schnall P, Baker D, Theorell T, Siegrist J, Peter R, Karasek R. Psychosocial factors: Review of the empirical data among men. *Occupational Medicine: State of the Art Reviews* 2000;15(1):24-46.

Brisson C. Women, work, and CVD. *Occupational Medicine: State of the Art Reviews* 2000;15(1):49-57.

# **Job Strain and Cardiovascular Risk Factors other than Blood Pressure (n=15 total studies)**

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	<b>Significant positive associations</b>	<b>Mixed positive and null associations</b>	<b>Total # of studies</b>
<b>cigarette smoking</b>	<b>3</b>	<b>6</b>	<b>11</b>
<b>serum cholesterol or high fat intake</b>	<b>0</b>	<b>2</b>	<b>7</b>
<b>sedentary behavior</b>	<b>1</b>	<b>1</b>	<b>3</b>
<b>body mass index</b>	<b>1</b>	<b>2</b>	<b>5</b>
<b>plasma fibrinogen</b>	<b>2</b>	<b>1</b>	<b>4</b>

# Job Strain, CVD and CVD risk factors: Main Effects

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- Low Job Decision Latitude
  - **some positive associations in 35 of 46 studies**
- High Job Demands
  - **some positive associations in 14 of 40 studies**
  - **inverse associations in 5 recent studies!**  
(positive in HANES x-sectional; inverse in HANES follow-up)
- Low Social Support
  - **positive in 5 of 13 studies**

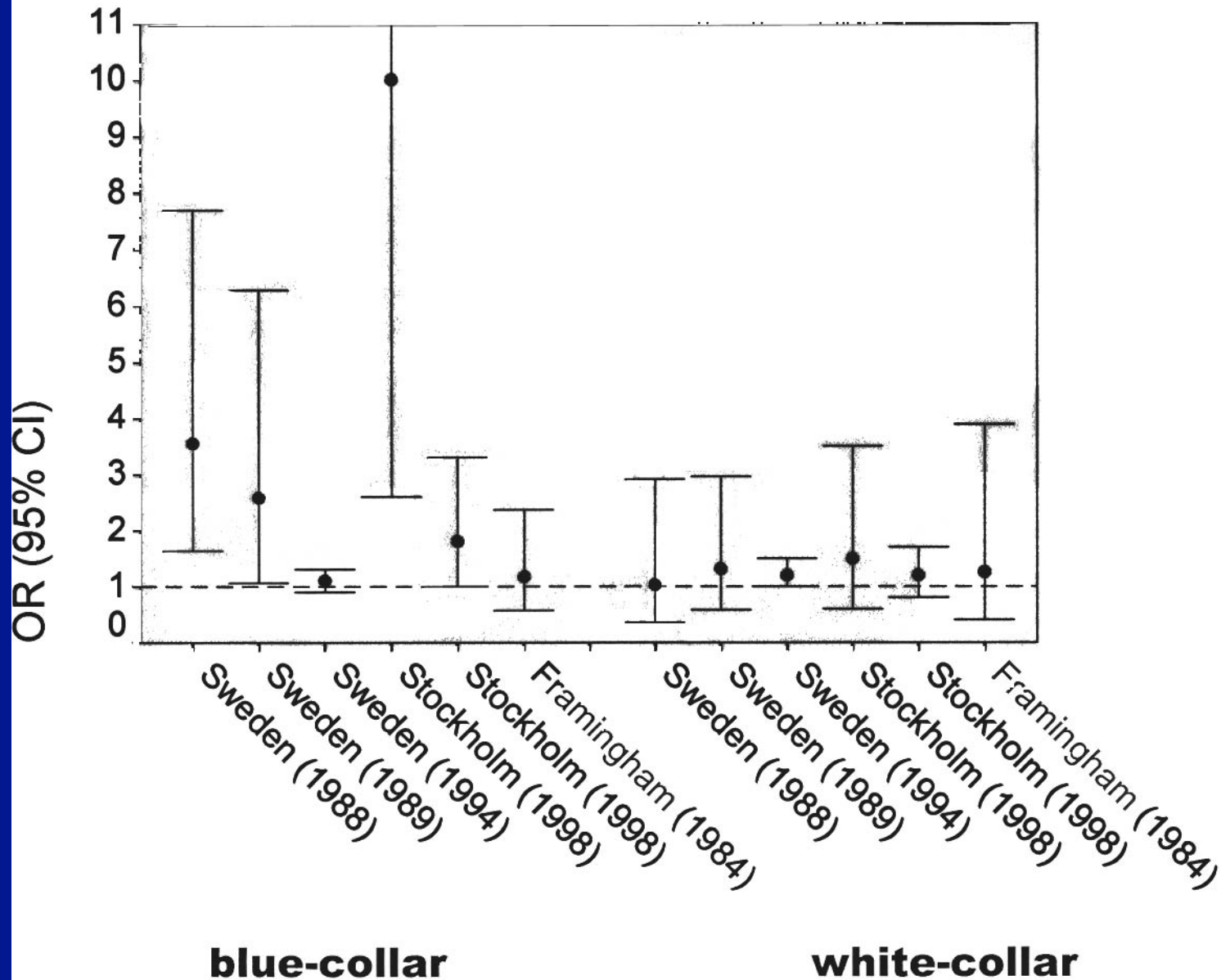


# Job Strain, CVD and CVD risk factors: Effect Modification

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- Stronger effects if:
- Older Age
  - **in 4 of 5 studies**
- Lower Socioeconomic Status (e.g., blue-collar workers)
  - **in 8 of 14 studies (but, 3 stronger for white collar)**
- Low Social Support
  - **positive in 5 of 6 studies**
- Similar effects for men and women:
  - **in 20 studies, similar effect sizes**
  - **stronger for men in 9, while stronger for women in 9**

## Job strain-CVD associations by SES -- men



# Job Strain, CVD and CVD risk factors: Methodological Issues

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- Imputation studies
  - **Positive in 8 of 12 CVD studies**
  - **Positive in 2 of 10 risk factor studies (+ 2 mixed)**
- Use of varied measures of
- Job decision latitude:
  - **Low “supervision clarity” (Framingham heart study)**
  - **Low income (Finnish Kuopio heart study)**
- Job demands:
  - **Physical demands (Finnish factory study)**
  - **Low autonomy & support, responsibility, insecurity, deadlines, mental stress (Kuopio heart study)**

# Framingham Heart Offspring Study

- Preliminary Analyses – June 2002
  - Job strain associated with increased cigarette smoking prevalence and # of cigarettes consumed
  - Isostrain associated with angina pectoris
  - Decision latitude and both systolic & diastolic bp
  - Job strain and systolic bp
  - Iso strain and CHD at exam 4 (OR 2.1) at exam 4
  - Iso Strain and CHD at exam 5 (OR 1.85) at exam 5

# Population attributable risk % for CVD due to Job Strain

<u>Study population</u>	<u>Years</u>	<u>Study Outcome</u>	<u>% Job Strain Exposure</u>	<u>RR</u>	<u>PAR%</u>
• New York City men	1985-8	High BP	21	2.8	27.4
• U.S. men - HES	1960-2	MI	21.8	2.48	24.4
• U.S. men - HANES	1971-5	MI	23.2	3.28	34.6
• Swedish men	1976-86	CVD	20	1.9	15.3
• European men and women	1996	CVD	30	1.5-2.0	13-23
			<u>%exposed</u>		
• Swedish men	1977-90	CVD	75 <sup>1</sup>	1.72	35
• Danish men	1991	CVD	6 <sup>2</sup>	2	6
• Danish women	1991	CVD	16 <sup>2</sup>	2	14
• <sup>1</sup> exposed to medium and low work control					
• <sup>2</sup> exposed to monotonous high-paced work					

# 1999 review article: Van Der Doef & Maes

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- METHODOLOGICAL ISSUES

- Low power for interaction effects in general (w/ OLS regression)
- Range of variance in job characteristics: national survey results
  - Low power for interaction or main effects in single occupation studies
- Conceptual overlap bet. measures of demands & psych outcome
- Self-report or “common method bias”

- THEORETICAL ISSUES

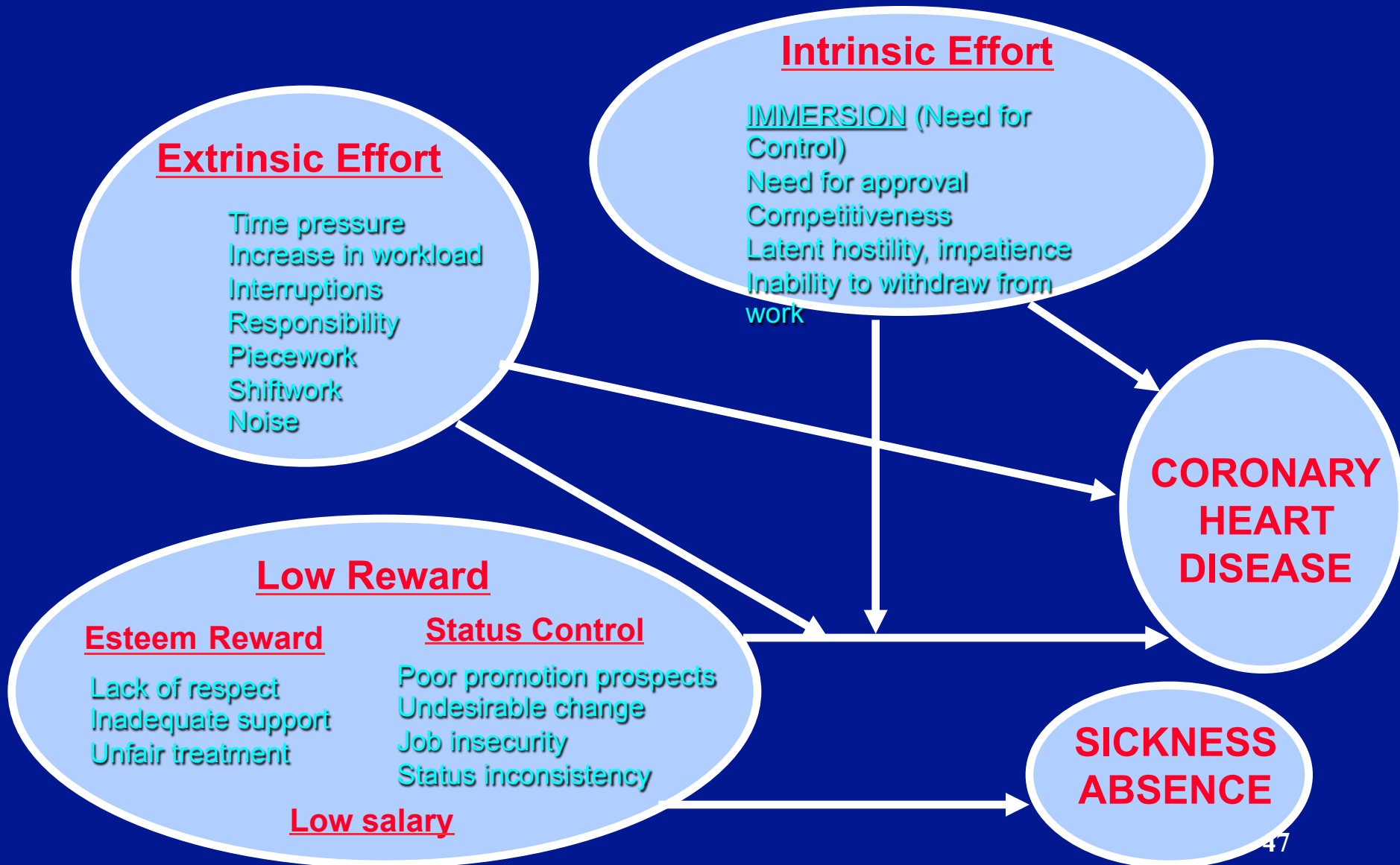
- Is multiplicative interaction the primary issue for the model?
  - Karasek (1989): “2 separate sets of outcomes (health, behavior) predicted by 2 different combinations of demands & latitude
- Are more job-specific measures of job demands needed?

- PRACTICAL (INTERVENTION) ISSUES

- Does it matter whether effects are interactive or only additive?
- Are job-specific measures more useful for intervention?
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# Effort-reward model of work stress

Johannes Siegrist, Heinrich Heine University of Dusseldorf



# Effort-Reward Imbalance and CVD

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- German male blue-collar workers – CHD predicted by:
  - **Status inconsistency**
  - **Low security, career opportunities**
  - **High effort**
  - **But not by job instability; job insecurity; piecework; shiftwork**
- Finnish men:
  - **High work demands *and* low income (for atherosclerosis)**
  - **High work demands, low resources *and* low income (for CVD)**
- British civil servants:
  - **High effort *and* low reward (for CHD)**
- Stockholm heart study – MI predicted by:
  - **Effort-reward imbalance (ratio >1)**
  - **Job strain**



# Effort-Reward Imbalance and HPT

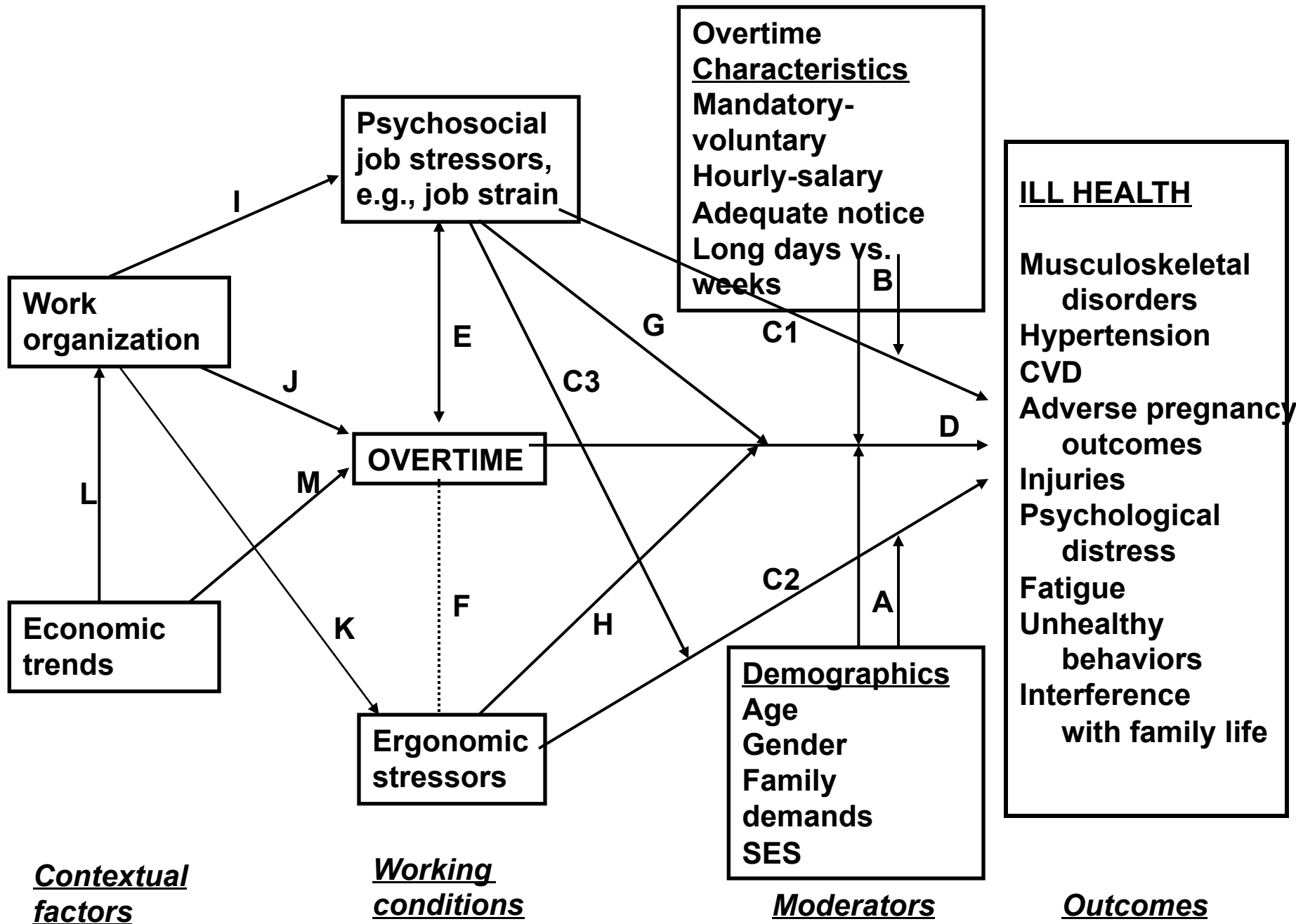
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- German male blue-collar workers – HPT & high LDL predicted by:
  - **Low promotion prospects**
  - **High effort-low reward**
  - **But not by job instability; work pressure**
- German male managers – HPT predicted by:
  - **Frequent interruptions and forced job change**
  - **But not lack of support; status incongruence; time pressure**
- Swedish men and women – HPT predicted by:
  - **Effort-reward imbalance**
  - **Rotating shift work**
  - **But not extrinsic effort**
- **Also some support for personality measures in model (anger, overcommitment, competitiveness)**

# Shiftwork, CVD and CVD Risk Factors

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- CVD
- Relatively few studies
- Not consistent (4 show effect, 4 do not)
- Tenkanen study – within a clinical trial
  - 40% excess risk
  - Not mediated by known risk factors
- Kawachi study of U.S. nurses
  - 30% excess risk, 50% for >6 years of shiftwork
  
- CVD Risk Factors
- Almost all studies cross-sectional
- Not consistent
- A few studies found higher rates of smoking, higher BP among shift workers



# Threat Avoidant Vigilance (TAV)

- *“The heaviest burden upon conscious attentional resources occurs when the human operator must continuously follow a barrage of incoming, predominantly visual signals to which he or she must be prepared to rapidly respond, whereby a momentary lapse, error or delay could have serious, potentially fatal consequences”*

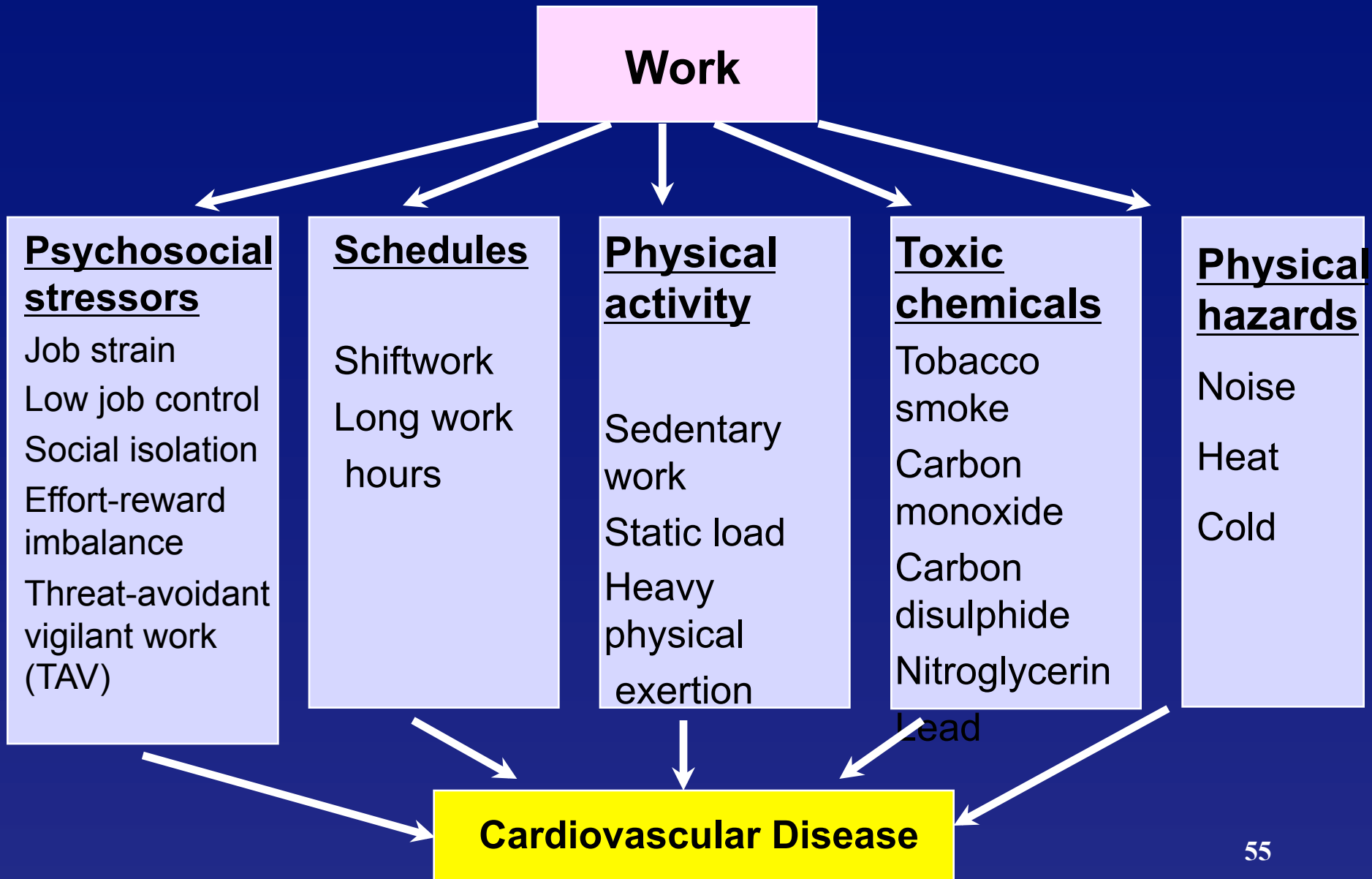
# Occupations with High TAV

- Airline Pilots
- Sea pilots
- Professional drivers of any motor vehicle
- Air traffic controllers
- Nuclear power plant operators
- Health professionals working in emergency settings
- Firefighters, police

# Occupations with High TAV at risk for

- Hypertension CVD
- Burnout/other adverse MH outcomes
- Professional Drivers
- Air traffic controllers
- Sea pilots
- Health care professionals (nurses, doctors)
- Fire-fighters

# Workplace CVD risk factors



# Empirical findings: Summary of Psychosocial workplace factors and health outcomes

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- Cardiovascular disease
  - Job strain studies
    - **Cornell work site blood pressure study**
  - Effort-reward imbalance studies
  - Shiftwork, overtime
  - Threat-avoidant vigilant work
  - Population attributable risk for workplace risk factors
- Psychological distress
- Musculoskeletal disorders
- CURRENT TRENDS: job strain, CHD
- Criteria for evaluating research studies



# CHANGES IN THE ORGANIZATION OF WORK IN MODERN TIMES

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- With the development of industrial society, profound changes have occurred in the way in which work is organized during the past two hundred years.
- Craftwork was largely replaced by the industrial revolution.
- Skilled workers, who had exercised substantial control over their work processes, were replaced by lower-skilled labor in new machine-based production technologies (Karasek, 1990: pp19-20).
- At the beginning of the 20th century, **Taylorism** further reshaped the workplace with its emphasis on narrow performance and efficiency using the technique of the assembly line, at the expense of employee collectivity and broader employee expertise and knowledge of the work process.
- Even lower-level white collar work, through office automation, has been shaped by the principles of the assembly line.
- More and more small businesses have been replaced by large centralized multinational organizations.

Schnall PL et al. Why the Workplace and Cardiovascular Disease. In: Schnall PL, Belkic KL, Landsbergis PA, Baker D, Eds. The Workplace and Cardiovascular Disease. Occupational Medicine: State of the Art Reviews. 2000;15(1).

# Taylorism

- **Goal was to simplify worker's tasks into the elemental skills required and then reorganize in minute detail by plans drafted by engineers (see Taylor, *principles of scientific management* 1911)**
- **Recommended 3 major changes in work**
  - **1<sup>st</sup> increase the work pace**
    - **Worker left with little possibility for psychological relaxation**
  - **2<sup>nd</sup> worker freed from the “burden” of making decisions about how to perform a job**
    - **Decreased decisional latitude**
  - **3<sup>rd</sup> worker worked alone**
    - **I.E., Was socially isolated**

# LEAN PRODUCTION

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- **Power to control the production process has been increasingly concentrated in the hands of management.**
- **The recent trend has been towards an acceleration of these changes in the workplace, an intensification of labor, characterized by a system of work organization know as “lean production”.**
- **“These dynamics include organization restructuring, mergers, acquisitions and downsizing, the frantic pace of work and life, the erosion of leisure time, and/or the blending of work and home time”<sup>1</sup>.**
- **“Most of these developments are driven by economic and technological changes aiming at short-tern productivity and profit gain”<sup>1</sup>.**

<sup>1</sup>The Tokyo Declaration: J Tokyo Med Univ 56:760-767, 1998

# Lean production

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## Japanese Production Management

- Continuous improvement in quality, productivity (“kaizen”)
- Just-in-time (JIT) inventory systems (“kanban”)
- Quality circles (QCs), Total Quality Management (TQM)
- Outsourcing

## 1990 MIT study claim:

- Work becomes “humanly fulfilling”

## Criticisms

- Cycle time remains short
- Highly standardized work
- Overtime common, workers’ personal time is buffer
- Employees expand “horizontal” control (influence over & responsibility for immediate job & work group), but management retains “vertical” control over total production system

# Lean production: Discussion questions

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- Are WRMDs in lean workplaces the “canary in the mine” -- a warning of increased future chronic illnesses?
- Are lean companies more productive than alternatives (e.g., Scandinavian Socio-technical-system (STS)) if the social costs of illness are included?
- Can there be a “democratic Taylorism”?
- Consultative vs. substantive participation: implications for intervention -- e.g., “participatory ergonomics”
- What are the health effects of “lean” economic trends -- downsizing, overtime, compressed work weeks, understaffing

# Lean production: Research questions

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## What is the impact of lean production on:

- Worker skills. True skill development or memorizing standardized company-specific procedures? Who controls training content, access?
- Co-worker support and worker solidarity? Is peer pressure used to increase work pace, deny injuries?
- Union strength, co-worker solidarity.
- Health in non-union workplaces, especially supplier firms.
- Workforces that are older and not so highly selected.

## What is the time period of the effect of lean methods?

## Are there healthier alternatives?

- Scandinavian socio-technical systems?
- Aspects of lean production for efficiency, quality in a context of a labor-management contract (“high-performance work organizations”)?
- Related work systems such as TQM, re-engineering, patient-focused care, modular, cellular or “agile” manufacturing?

# CURRENT TRENDS IN WORKING CONDITIONS: The “Lean” Economy

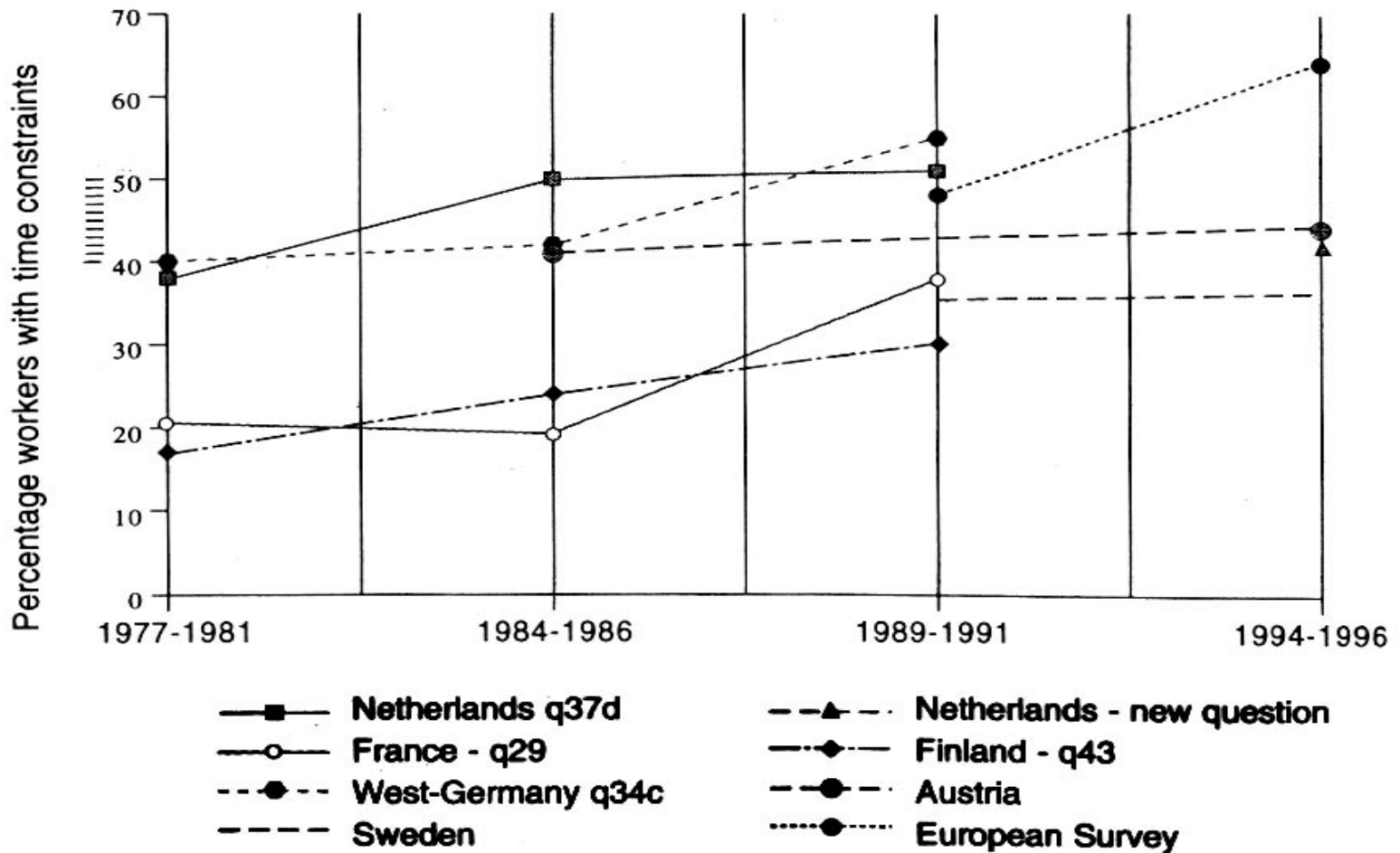
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## Macro economic trends

- Global economy
- Stagnant or falling real income
- Increasing income inequality
- Downsizing

## Workplace trends

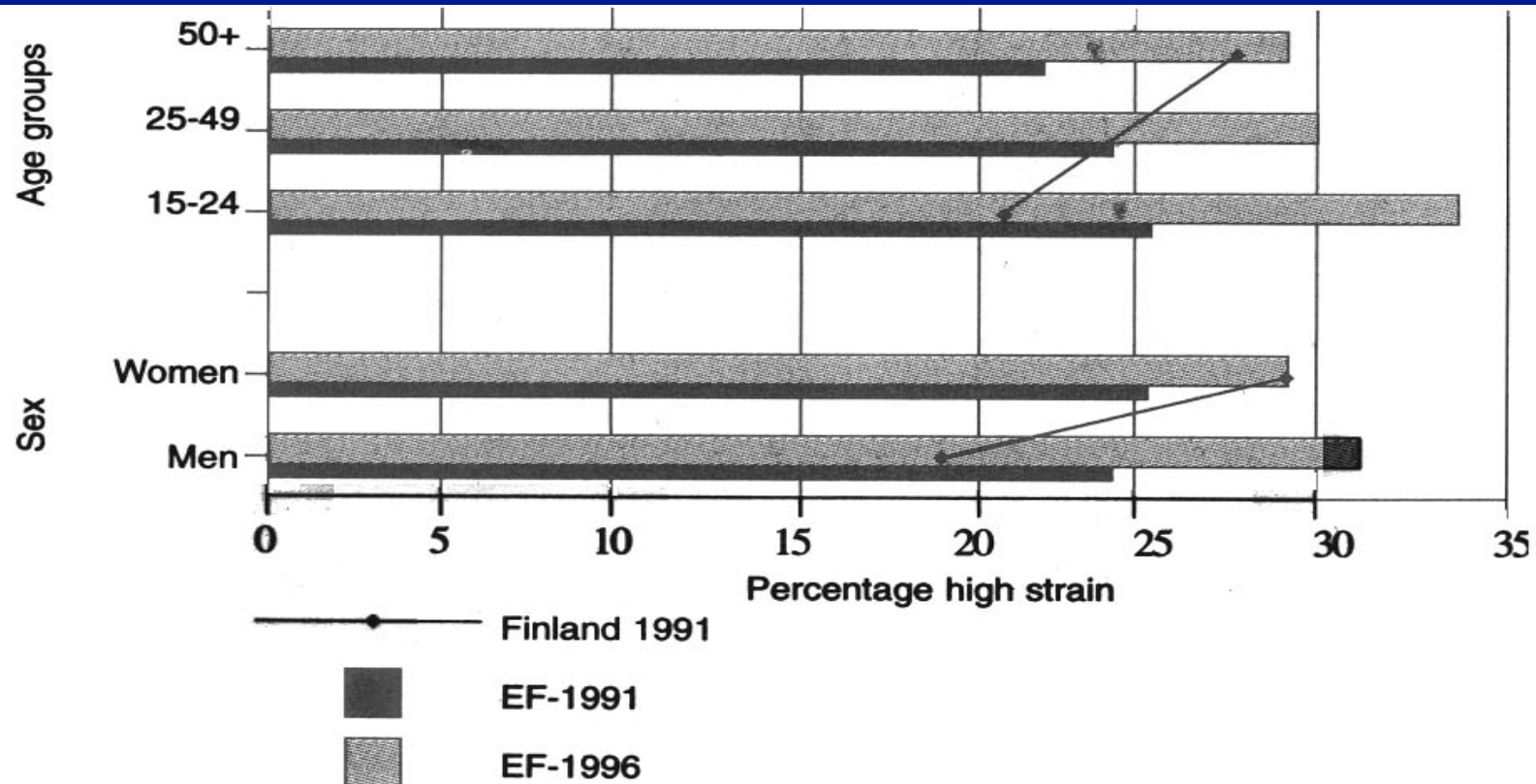
- New systems of work organization
- Weaker unions
- Temporary & contingent work
- Increasing work hours
- Compressed work weeks
- Increasing job strain



***The development of time constraints in Europe***

“Time constraints” are similar to job pressures or job demands, and include deadlines and work speed.





*Gender and age groups:  
comparison of workers at risk in  
Finland and the two European surveys  
on the work environment*

Source: Time constraints and autonomy at work in the European Union. Dublin: European Foundation for the Improvement of Living and Working Conditions, 1997. <sup>65</sup>

# Health impacts of the lean economy:

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## Downsizing

Increases in minor psychiatric disorders, blood pressure & weight among English male govt employees (Ferrie et al., 1998)

Fatal occupational injuries in U.S. (Richardson & Loomis, 1997)

Absenteeism & musculoskeletal disorders in Finland, especially in older workers (Vahtera et al., 1997)

## Excessive overtime

Stress, fatigue, family problems (Cooper, 1996)

Karoshi (Nishiyama & Johnson, 1997)

Hypertension (Hayashi et al., 1996)

Heart disease (Falger & Schouten, 1992; Tuchsén, 1992; Uehata, 1991)

# CVD risk factor trends in U.S.:

## Health impacts of the lean economy?

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### Decreases in

Smoking

Cholesterol

### Increases in

Overweight

Diabetes

Blood Pressure

### Little change in

Physical inactivity

Hypertension

### Increase in SES gradient for

Smoking

Physical inactivity

# The Role of technology in Workplace Changes – I

- Who does it serve
- How are decisions made to introduce
- Can it be a progressive force

# The Role of technology in Workplace Changes – 1

- modern tech – for it to work to satisfy healthy human needs
- can use the new tech of evaluation to monitor excess stressors in the environment
- flip side of worry that corporations will use new methods to increase exploitation
- what – your bp isn't high enough??

# Tokyo Declaration 1998

- The growth of neuroscience and stress science has allowed elucidation of the links between social structures and processes (at work and outside it), the way in which these are perceived and appraised and the resulting interaction between the central nervous system and other organ systems to promote or counteract workers' health, based on a bio-psycho-social approach to all relevant aspects of the man-environment ecosystem and its dynamics. These dynamics include organizational restructuring, mergers, acquisitions and downsizing, the frantic pace of work and life, the erosion of leisure time and/or the blending of work and home time. Most of these developments are driven by economic and technological changes aiming at short-term productivity and profit gain.

# **CONCLUSIONS**

- **We have summarized the evidence and made the case for a causal relationship between the workplace and CVD.**
- **We also discuss the implications of the trends toward deteriorating working conditions (e.g., lean production, downsizing, and longer work hours).**
- **There is reason for concern that these trends will result in greater exposure to psychosocial risk factors at the workplace which may, in turn, increase the CVD epidemic.**
- **Since this CVD epidemic is engendered, at least in part, by the social organization of work and other noxious workplace exposures, this raises the possibility of the primary prevention of cardiovascular disease via interventions aimed at improving the work environment.**
- **The legislative changes and public health interventions outlined above can help create a climate in which healthy work becomes the priority.**

# A short list of what's needed

- better understanding of the problem that is “noxious work”
- better identification of the scope of the work-related health problems
- ‘efforts at workplace change carried out collectively between workers, researchers, and management
- we need social policies that recognize that unhealthy workplaces result, in part, from the current imbalance in power between working people and management
- need new regulations that will discourage the worst forms of work organization and psychosocial stressors



# Laws and Regulations

- we need laws and regulations that make employment less precarious and to improve the social safety net so that workers will not feel forced to keep a hazardous job simply because s/he needs the health insurance, or because there is no job security and would fear being fired if they raised any complaints.
- we need laws and regulations that encourage autonomy and involvement at both work and in the community and which will encourage ordinary citizens to be more active participants in the life of our country.

# More Laws and regulations

- There are many steps needed to encourage active participation by members of society but three in particular would appear most helpful:
  1. Laws and regulations that remove the current obstacles to joining unions.
  2. Limiting the work week and/or overtime to allow for greater social participation.
  3. Election laws that make it easier for people to participate in government (e.g., elections held on a day without work).
- Lastly, we need to increase the availability of work, improve the adequacy of income from work, and have work schedules and policies that help workers balance work and their personal or family needs and responsibilities [47].

# WHAT NEEDS TO BE DONE

## *PUBLIC POLICY INITIATIVES*

- **Surveillance**
- **Occupational cardiology**
- **Economic legislation: Incentives for lowering cardionoxious exposures**
- **National legislation to provide for a healthy working environment**
- **Interventions at the workplace**

Belkic K, Schnall P, Landsbergis P, Baker D. Conclusions and thoughts for a future agenda regarding the workplace and cardiovascular health. In: Schnall PL, Belkic KL, Landsbergis PA, Baker D, Eds. *The Workplace and Cardiovascular Disease. Occupational Medicine: State of the Art Reviews*. 2000;15(1).

# SURVEILLANCE

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Participants at an international conference at Tokyo Medical University in 1998 called for:

“ *Surveillance at individual workplaces and monitoring at national and regional levels, in order to identify the extent of work-related stress health problems and to provide baselines against which to evaluate efforts at amelioration. They recommend that workplaces assess both workplace stressors and health outcomes known to result from such exposures [e.g., job strain and hypertension] on an annual basis.*”

# WHY INTERVENE AT THE WORKPLACE?

- **If we accept that it is the workplace which creates a major source of risk of CVD as well as other adverse health outcomes, then, primary intervention (i.e. aimed at the workplace characteristics themselves) will be the effective way to prevent risk.**
- **Interventions located at the worksite are:**
  - **less expensive than treatment**
  - **the best place to lower established risk factors through behavioral techniques**
  - **provide cardiovascular disease prevention through work reorganization**

Belkic K, Schnall P, Landsbergis P, Baker D. Conclusions and thoughts for a future agenda regarding the workplace and cardiovascular health. In: Schnall PL, Belkic KL, Landsbergis PA, Baker D, Eds. The Workplace and Cardiovascular Disease. Occupational Medicine: State of the Art Reviews. 2000;15(1).

# Workplace interventions (chapter 13, OM:STAR)

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- Levels of intervention

- Individual

- PPE, stress management, health promotion

- Individual/group interface level

- Support groups, assertiveness training

- Organizational level

- Company policies
    - Changing shiftwork systems
    - Changing organizational structures, job characteristics to allow more control, predictability, skill, support and to moderate demands  
(see pp. 80, “Stop Stress at Work”)

# Workplace interventions (chapter 13, OM:STAR)

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- Heart disease prevention strategies
  - High-risk intervention
  - Mass intervention
  - Environmental

# Healthy Work

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- These are among the basic protective measures so that work is not unhealthy.
- However, healthy work is not just the absence of unhealthy conditions.
- Healthy work addresses the human need for;
  - fulfilling work,
  - work that satisfies human needs for dignity, creativity, and a sense of purpose.

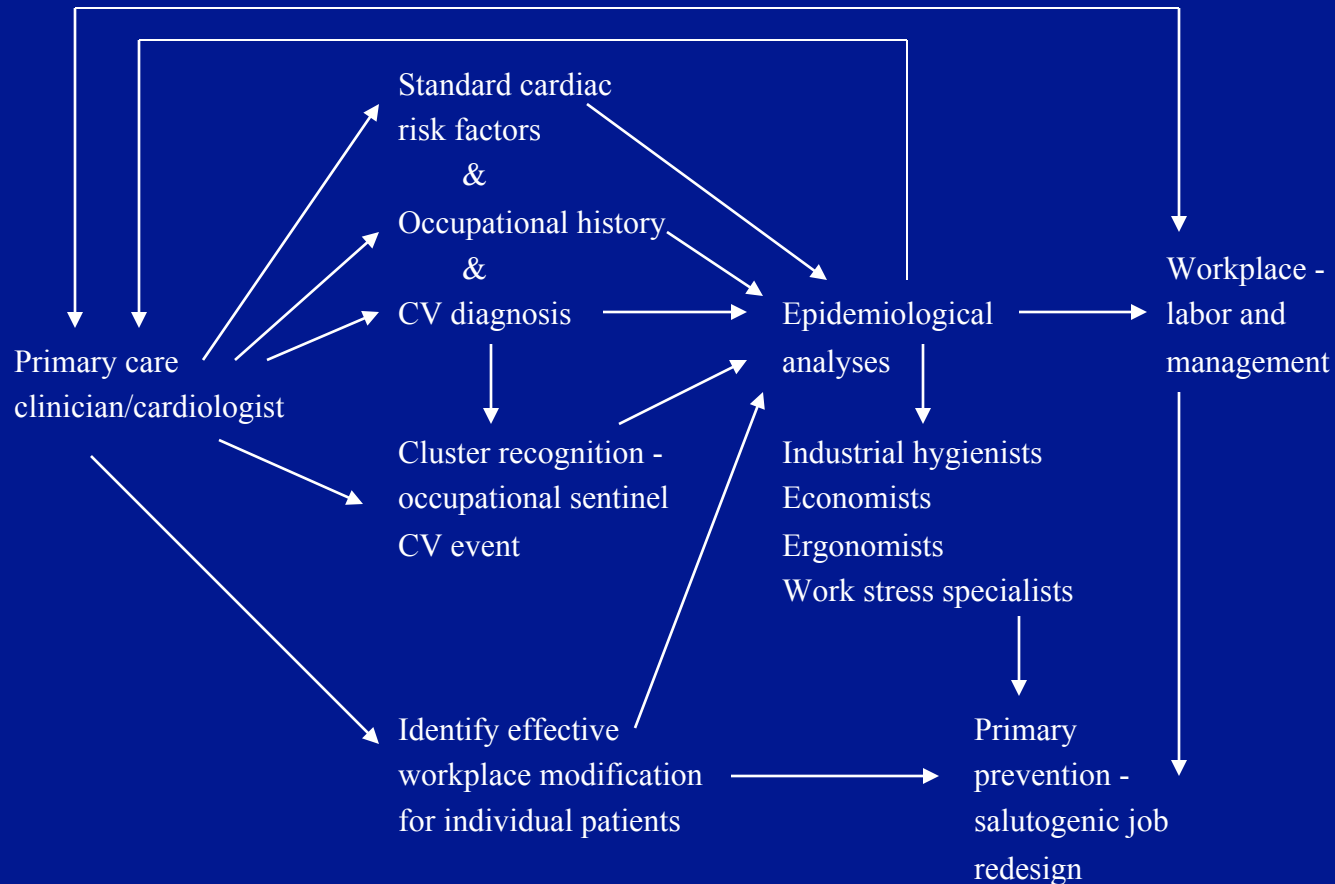


# **THERE IS A NEED FOR THE DEVELOPMENT AND PROMOTION OF A NEW DISCIPLINE: OCCUPATIONAL CARDIOLOGY**

**Occupational Cardiology would link primary cardiologists and occupational health specialists to:**

- **Recognize the major role of the workplace in the etiology of hypertension and CVD.**
- **Establish the concept of occupational and sentinal health events within the realm of cardiology (identification of clusters of work-place related hypertension and CVD).**
- **Incorporate occupational history-taking into the standard cardiologic work-up.**
- **Encourage the broadest possible application of ambulatory monitoring techniques**
- **Develop and validate protocols for the diagnostic work-up of patients with cardionoxious jobs.**
- **Provide guidelines for modification of the cardionoxious workplace, to protect individual cardiac patients**
- **Strive to define and implement a “heart healthy” work environment for all working people**

## Occupational Cardiology in a primary care setting: A public health approach



*Occup Med* 15: 2000. Schnall PL, Belkic K, Landsbergis PA, Baker D. eds. A public health approach in clinical practice. Fisher J, Belkic KL., p. 249.

# Implications for Occupational cardiology

- Given the rising prevalence of these cardionoxious working conditions, clinicians will more and more often be faced with the quandary of whether or not to sanction their patients' continued exposure to the work environment.

# Implications for Occupational cardiology cont:

- Heretofore, when clinical cardiology has addressed the work environment, it has usually been in relationship to questions of physical exertion, temperature extremes, or certain chemical hazards, rather than psychosocial stressors.

# Implications for Occupational cardiology cont:

- A key challenge for the newly emerging discipline of Occupational Cardiology will be to develop guidelines for prevention-oriented clinical practice, with particular attention to the dangers inherent in a high strain work environment, especially for patients with hypertension or IHD.

# Occupational Cardiology would link primary cardiologists and occupational health specialists to:

- Recognize the major role of work in the etiology of hypertension and CVD.
- Establish the concept of occupational and sentinel health events within the realm of cardiology (identification of clusters of work-place related hypertension and CVD).
- Incorporate occupational history-taking into the standard cardiologic work-up.
- Encourage the broadest possible application of ambulatory monitoring techniques.
- Develop and validate protocols for the diagnostic work-up of patients with cardionoxious jobs.
- Provide guidelines for modification of the cardionoxious workplace, to protect individual cardiac patients.
- Strive to define and implement a “heart healthy” work environment for all working people.

# **THE OCCUPATIONAL HEALTH SPECIALIST / PSYCHOLOGIST**

## **Potential Role & Contribution**

- **Identify key workplace stressors**
- **Formulate interventions for individuals and groups**
- **Plan & implement interventions for the workplace as a whole**
- **Coordinate with clinicians for evaluation & treatment of individuals with negative health outcomes**
- **Function as part of a group--collective approach (Ombudsman Role)**

# **THE OCCUPATIONAL HEALTH SPECIALIST/ PSYCHOLOGIST**

## **Potential Role & Contribution**

**Identify key workplace stressors:**

- **Take an occupational history, with a focus upon psychosocial workplace stressors**
- **Perform surveillance of the workplace as a whole**



# **THE OCCUPATIONAL HEALTH SPECIALIST/ PSYCHOLOGIST**

## **Potential Role & Contribution**

### **Comprehensive Protection of the Health of Working People**

- Health promotion at the workplace
- Stress management
- Job redesign

# THE OCCUPATIONAL HEALTH SPECIALIST/ PSYCHOLOGIST

## Potential Role & Contribution

Coordinate with clinicians for evaluation & treatment of individuals with negative health outcomes

- Help make informed recommendations about the workplace for various patient groups  
e.g. what could be a *reasonably* safe work environment for a patient who has had a heart attack?
- Identify effective workplace modifications for individual patients, that might inform primary workplace interventions (bridge between the clinical and the public health approach)

# THE OCCUPATIONAL HEALTH SPECIALIST/ PSYCHOLOGIST

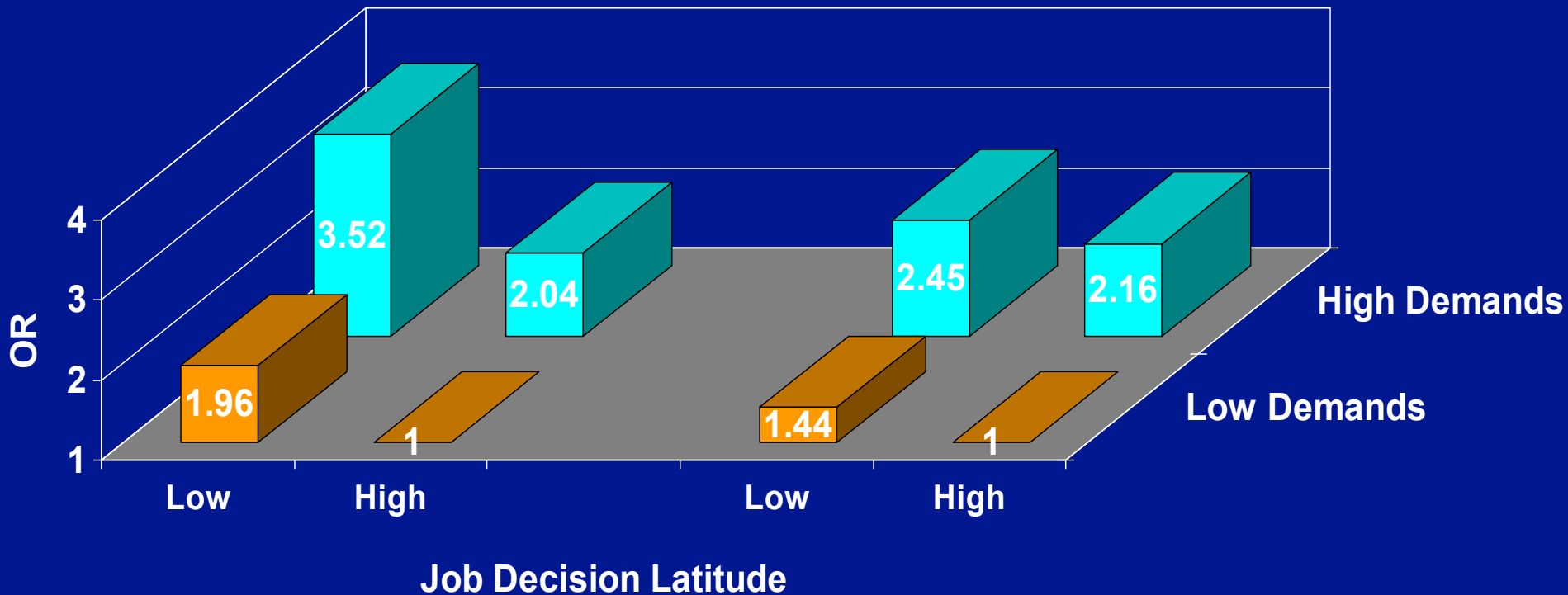
## Potential Role & Contribution

### *Function as part of a group--collective approach*

- Advocate for patients (Ombudsman)
- Interface with trade unions and labor-management bodies
- Cooperate with industrial hygienists, economists, ergonomists, epidemiologists
- Communicate with public policy makers

END

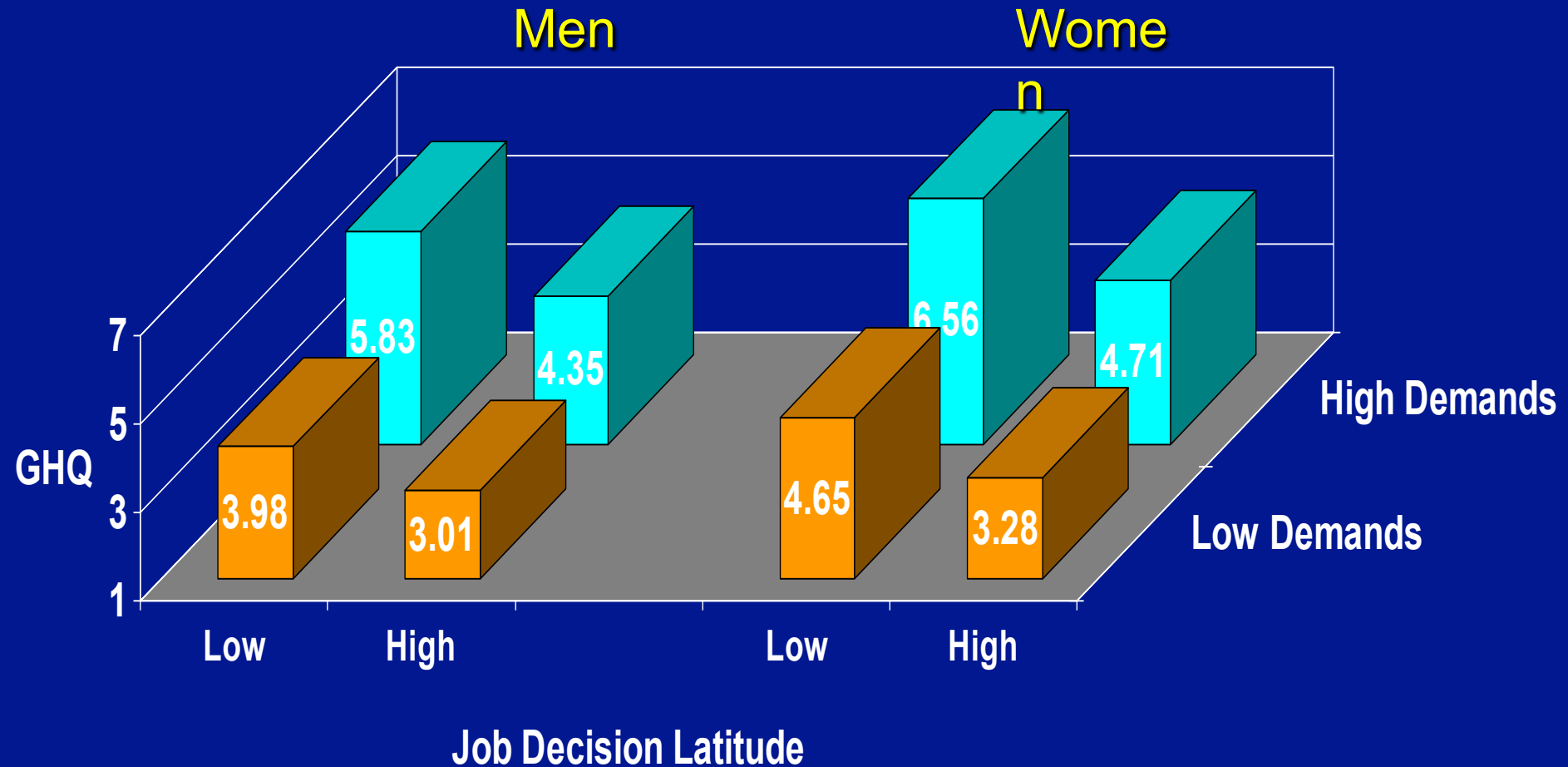
# High psychological distress (top 20% of PSI) among 2,889 Quebec white-collar workers, 1992-93



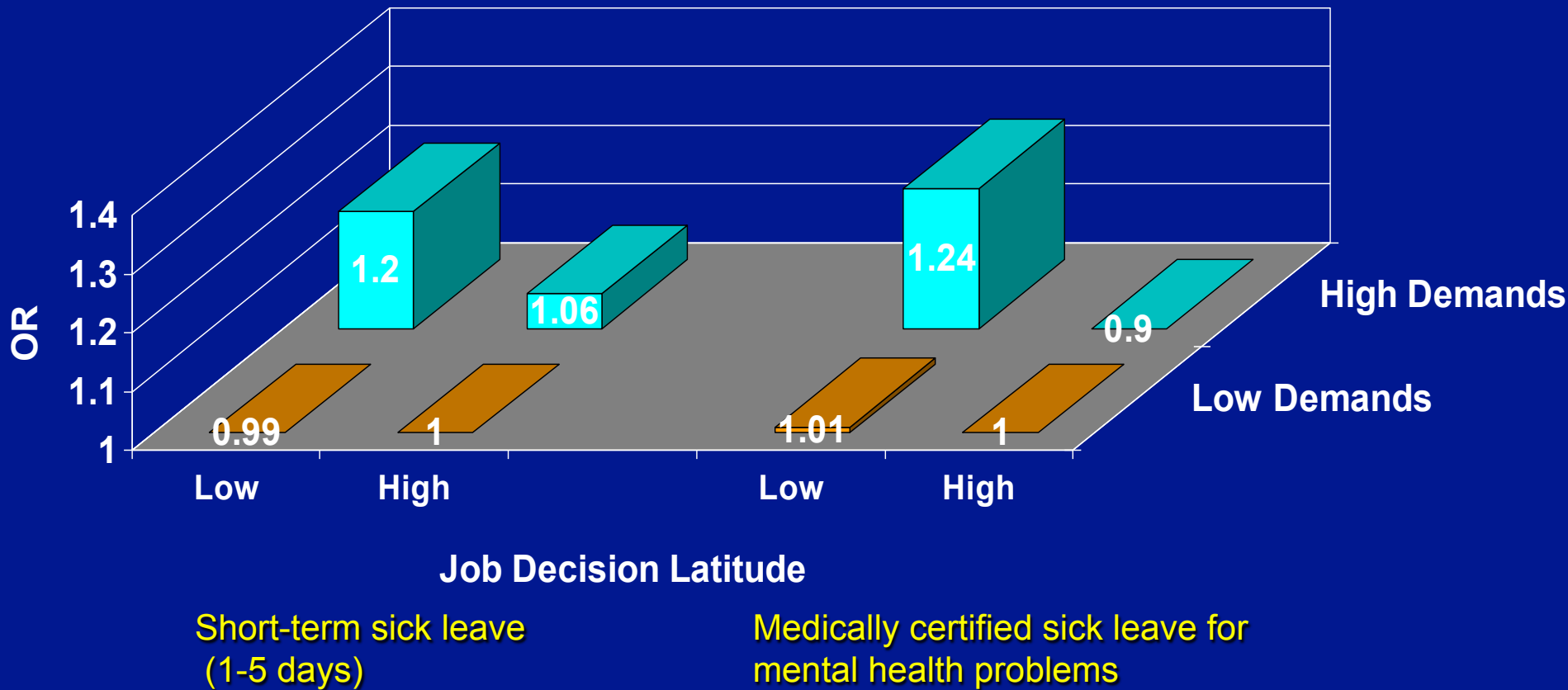
Crude Association

Adjusted for Age, Gender, Employment Status, Occupation, Social Support, Cynicism, Hostility, Domestic Load, Past Year Stressful Life Events

# Psychiatric disorder (30-item GHQ) among 10,314 British civil servants (Adjusted for age and employment grade)



# Job strain and sickness absence: 20 month follow-up among 1,793 Quebec nurses



# 1999 review article: Van Der Doef & Maes

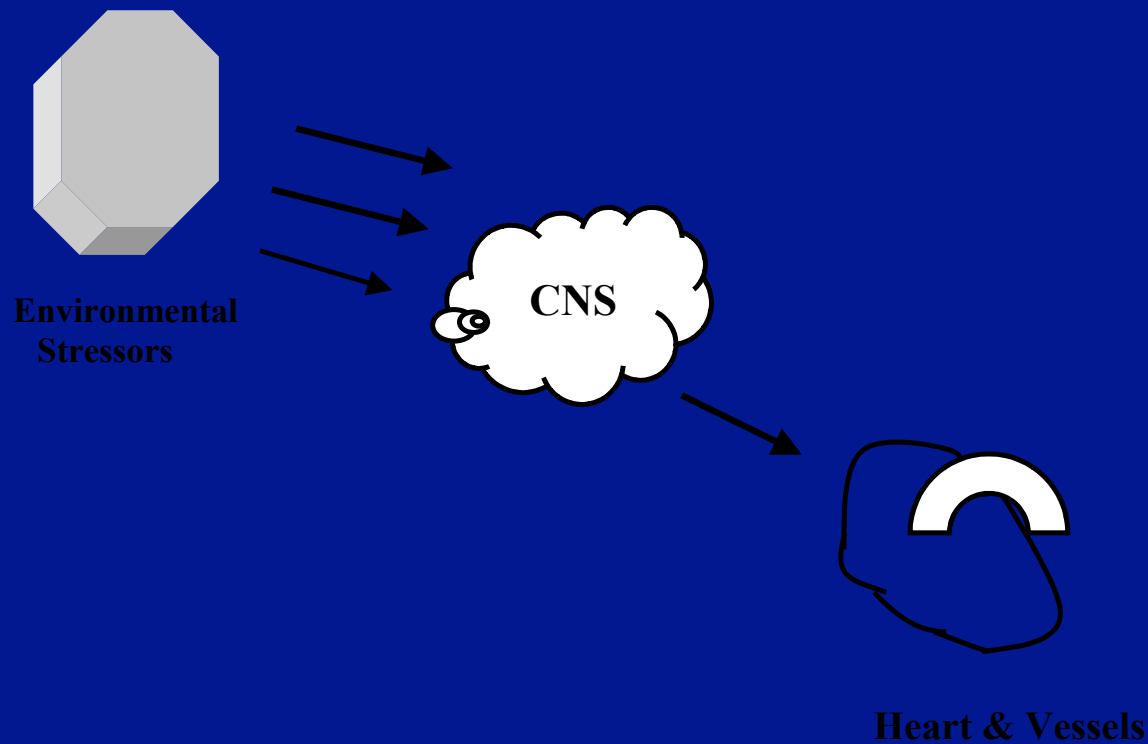
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	JDC Model		JDCA Model		
Total N of					
<u>Outcome</u>	<u>Strain</u>	<u>Buffer</u>	<u>Strain</u>	<u>Buffer</u>	<u>Studies</u>
• Psych well-being	28/41	15/31	9/19	2/5	43
• Job satisfaction	18/30	10/23	8/14	2/6	31
• Job “burnout”	3/4	0/4	1/1	0/2	4
• Job-related					
• Psych well-being	7/8	1/2	1/2	1/1	8

• (ratio of supportive to total studies)  
 Van Der Doef, M., & Maes, S. (1999). The job demand control(-support) model and psychological well-being: a review of 20 years of empirical research. *Work & Stress*, 13(2), 87-114.



# ECO-NEUROCARDIOLOGY: Environment-Brain-CV System Arc



# ECO-NEURO-CARDIOLOGY

”The biological paradigm by which social factors, such as work stress, are perceived and processed by the central nervous system, resulting in pathophysiological changes that increase CVD risk”

Belkic, Schnall, Landsbergis, Baker. The Workplace & Cardiovascular Health: Conclusions and thoughts for a future agenda. Occupational Medicine State of the Art Review, 2000; 15: p.313.

# ECO-NEURO-CARDIOLOGY

- Renders plausible the various theoretical constructs of work stress as they relate to CVD
- Offers a framework in which to grasp how stress mechanisms give rise to various cardiovascular target organ responses
- Empirically grounded

Belkic K. The Forebrain: Central stress mechanisms and Cardiovascular Responses. Occupational Medicine State of the Art Review, 2000; 15: p. 109.

# Terminology in stress research

There is much confusion over the use of terms

- *Stressors refers to specific exposures that produce a stress response of some sort*
  - 1) **Physicochemical stressor - external environment represented by "nature."**
  - 2) **Social stressor - the "social environment."**
  - 3) **Biological stressor - the internal environment.**
  - 4) **Mental stressor - psychological condition such as pleasantness and unpleasantness.**
- *Stress refers to the response of the organism to various stimuli. That different stimuli may produce different responses in different people*
  - **Stress responses may be psychological as well as physiological.**
  - **Sometimes there can be a physiological response to a stressor without a concomitant conscious recognition of an emotional response**
  - **Many of the key demands on the individual are invisible**

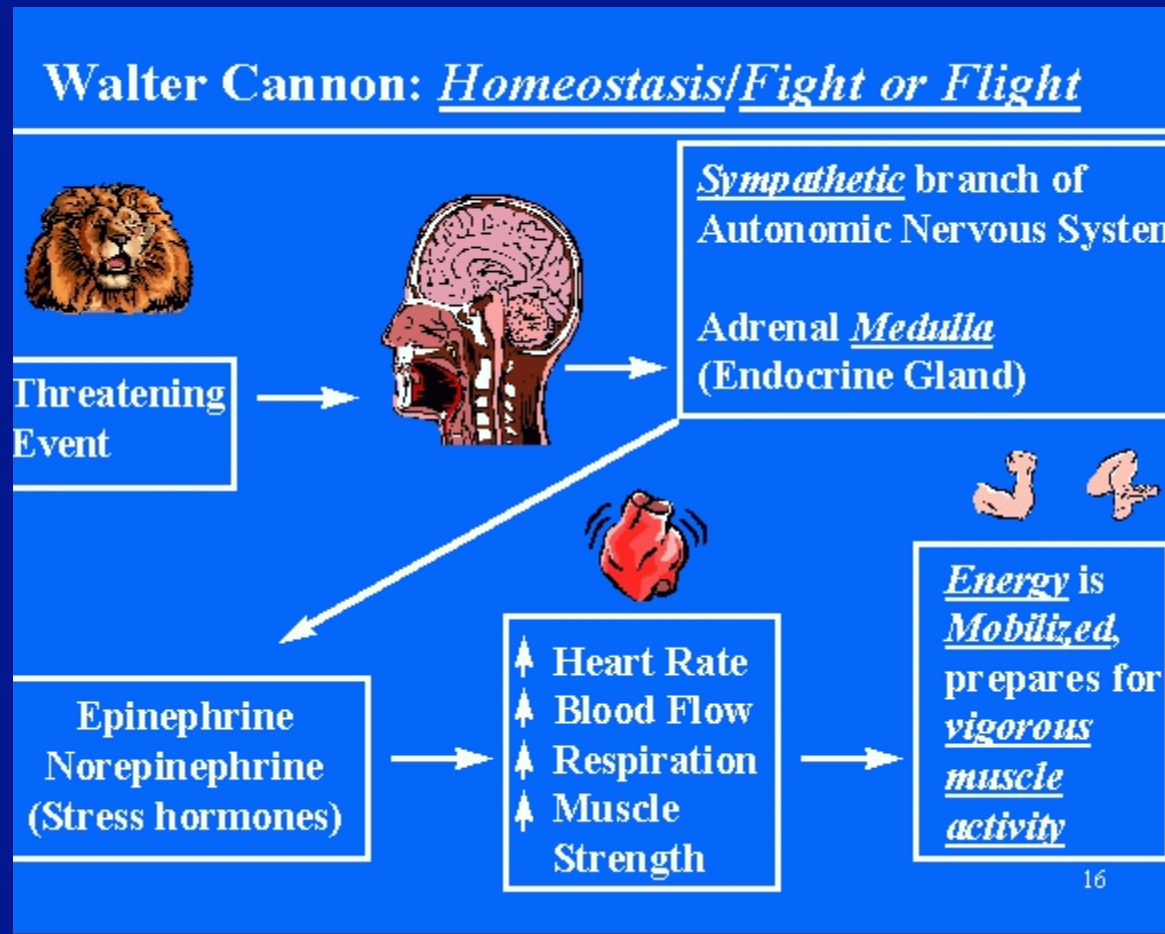
## Terminology Cont:

- *Strain is frequently used interchangeably with stress in the literature*
- *However, there is an element of duration, chronicity and severity associated with strain as opposed to stress*

# The fight/flight reaction model (defense reaction) – the work of Walter Cannon

- **Research on the sympathetic adrenal-medullary (SAM) system has its roots in the work by Walter B. Cannon in the beginning of this century (Cannon, 1914).**
- **On the basis of animal experiments, he described the fight-or-flight response or the emergency function of the adrenal medulla. This defense reaction prepares the body for battle.**
- **The SAM system is activated when the individual is challenged in its control of the environment. Via the hypothalamus and the sympathetic nervous system, psychological stress stimulates the adrenal medulla to secrete the two catecholamines, epinephrine (adrenaline) and norepinephrine (noradrenalin), into the blood stream.**
- **The defense reaction is a response to threat when the organism has some control in responding, and actually has the chance to fight or flee.**

# The Defense Reaction/Response



# A role for the defense response in disease

- Levi points out that many common threats and challenges of social situations including work will elicit the defense response.
- Since most of these situations are often chronic and are not resolved by a fight-or-flight reaction, a prolonged state of “visceral-vascular readiness” is likely to emerge. A concept developed by Robert Elliot an American Cardiologist
- When this mobilized energy is not discharged it is harmful resulting in elevations in catecholamine excretion and increased bp typical of the defense response.
- Henry (1994) states: "chronic arousal of the defense response with catecholamine and renin release provides a physiological mechanism giving rise to sustained hypertension" .



# CONVERGENT VALIDATION

THE EMPIRICAL (EPIDEMIOLOGIC), THEORETICAL AND BIOLOGICAL EVIDENCE... PROVIDES CONVERGENT VALIDATION THAT THE RELATIONSHIP BETWEEN WORKPLACE STRESSORS AND CVD RISK IS CAUSAL.

**In other words, the empirical findings are consistent with and predicted by the theoretical models, while the linkage between the theoretical models and empirical evidence is demonstrated to be plausible by considering biological mechanisms and experimental research<sup>1</sup>.**

<sup>2</sup> Belkic K, Schnall P, Landsbergis P, Baker, D. Conclusions and thoughts for a future agenda regarding the workplace and cardiovascular health. In: Schnall PL, Belkic KL, Landsbergis PA, Baker D, Eds. The Workplace and Cardiovascular Disease. Occupational Medicine: State of the Art Reviews. 2000;15(1).

# What's missing

- Laboratory Studies
- Field Studies
- **Interventions**
  - Support causality and
  - Practicality

# A Case History

## Charlie Chaplin in “Modern Times”

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- Opening 15’ we see Charlie undergoing a series of workplace incidents. Charlie is traumatized and has a “breakdown”.
- The key question - is Charlie the victim of unhealthy working conditions - or is he the victim of his own neuroticism?

# Charlie Chaplin in “Modern Times” (Continued)

- Charlie is subjected to:
  - Speedup
  - Paced work
  - Short cycle time,
  - Underload (very simple tasks done very fast),
  - He is victimized by surveillance (lack of control and a hard driving supervisor),
  - and fragmentation of work.

# Charlie Chaplin in “Modern Times” (Continued)

- Is Chaplin’s character in the movie just a historical relic? What does his job have in common with contemporary lean production factories, and “lean” work in other manufacturing and service industries (health care, education, IT)?
- Furthermore, we must ask:
  - Is this process limited to production workers. For other sectors including white collar and knowledge workers new technologies are being used to speed up work and erode private time, e.g., see examples in Ch 14 of OM:STAR

# Back to Charlie

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- We could teach him how to better cope with food feeding machines.
- We could teach him how to meditate on his work break in the bathroom (? while his boss is yelling at him to get back to work).
- We could try to teach Charlie to take stress in stride - recommend that he not take work so seriously.
- We could send him to an EAP.

# Help for Charlie

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- Charlie does need EAP.
- He might also benefit from stress management techniques.
- But first and foremost he needs a healthier work environment.

# What does Charlie Need Changed About His Job?

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- This is the most difficult issue to address under the constraints of modern production.
- There is an inherent conflict between human needs and the need to maximize productivity (in a narrow sense as it ignores many human needs).
- First, let's ask Charlie about his job and how he would improve it. Charlie doesn't have all the answers, and neither do we. We can combine his knowledge with what we have learned about what is harmful about work.



# What does Charlie Need Changed About His Job? (cont)

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- *Here are some basics for starters: We need :*
  - A safe and comfortable physical environment.
  - A work week with an upper limit.
  - A reasonable number of breaks.
  - An upper limit on workload and speed.
  - A say about how work gets done.
  - To identify especially taxing conditions and limit exposure to such.
  - To minimize conflict and uncertainty.
  - To bolster healthy human support.