

**2nd ICOH International Conference  
on Psychosocial Factors at Work**

**Satellite program**

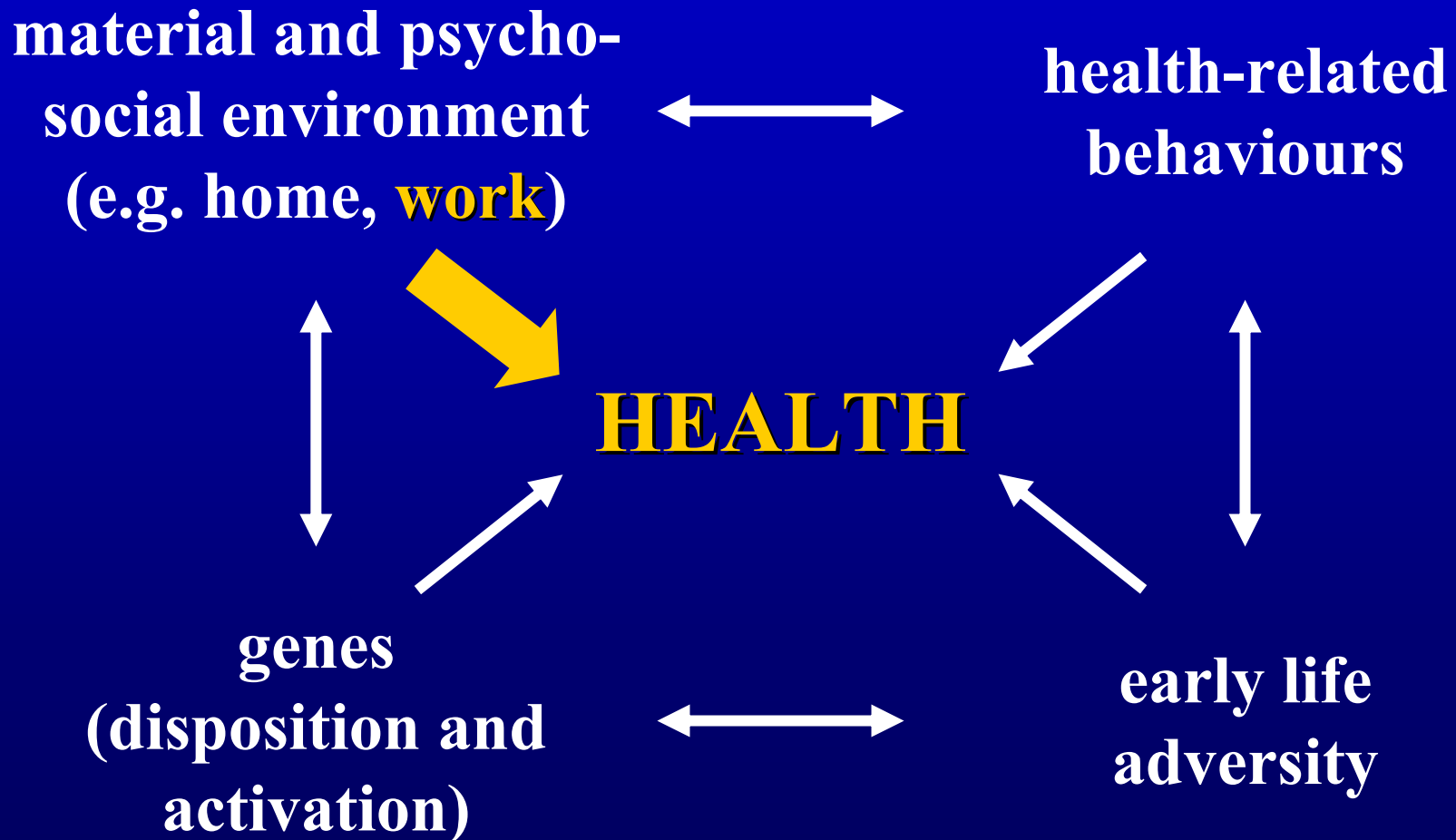
Okayama, August 24-26, 2005

**Work stress and health  
in a globalized economy: contribution  
of the effort-reward imbalance model**

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# Major determinants of health



# Scientific tasks

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- To identify pathogenic and protective effects of work on health
- To assess scientific evidence through prospective epidemiologic studies, basic and intervention research
- To develop preventive measures at different levels of policy

# Content of the lecture

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- I. Introduction: work and health; theoretical models; role of globalization**
- II. Effort-reward imbalance and health: scientific evidence (epidemiological studies and basic research)**
- III. Policy implications at different levels**

# I. Introduction: Work and health: dimensions of analysis

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- Physical and chemical hazards
- Shift work
- Posture, physical (in)activity
- Psychosocial work environment

# Importance of work for health

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## Work ...

- provides a source of regular income and related opportunities
- provides a source of personal growth and training opportunities
- provides social identity, social status and related rewards
- enables access to social networks beyond primary groups
- influences a person's self efficacy and self esteem
- exposes a person to differential quality of work environment

# Psychosocial work environment

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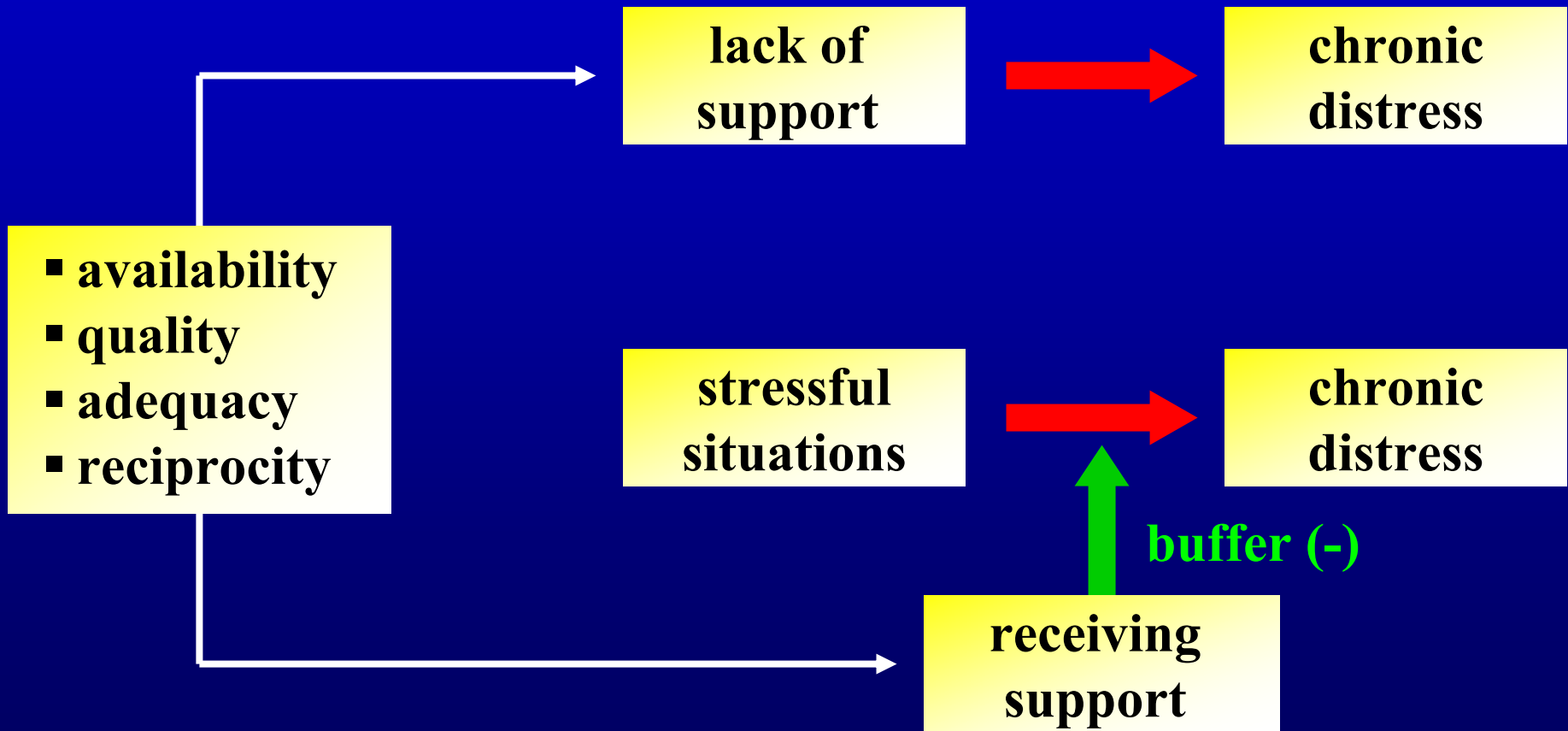
Environment providing options / barriers to meet basic psychological needs of working people:

- **sense of belonging**  
(membership role; social identity)
- **sense of control**  
(task accomplishment; self-efficacy)
- **experience of reward**  
(contractual reciprocity; self-esteem)

Theoretical models with a focus on these needs:

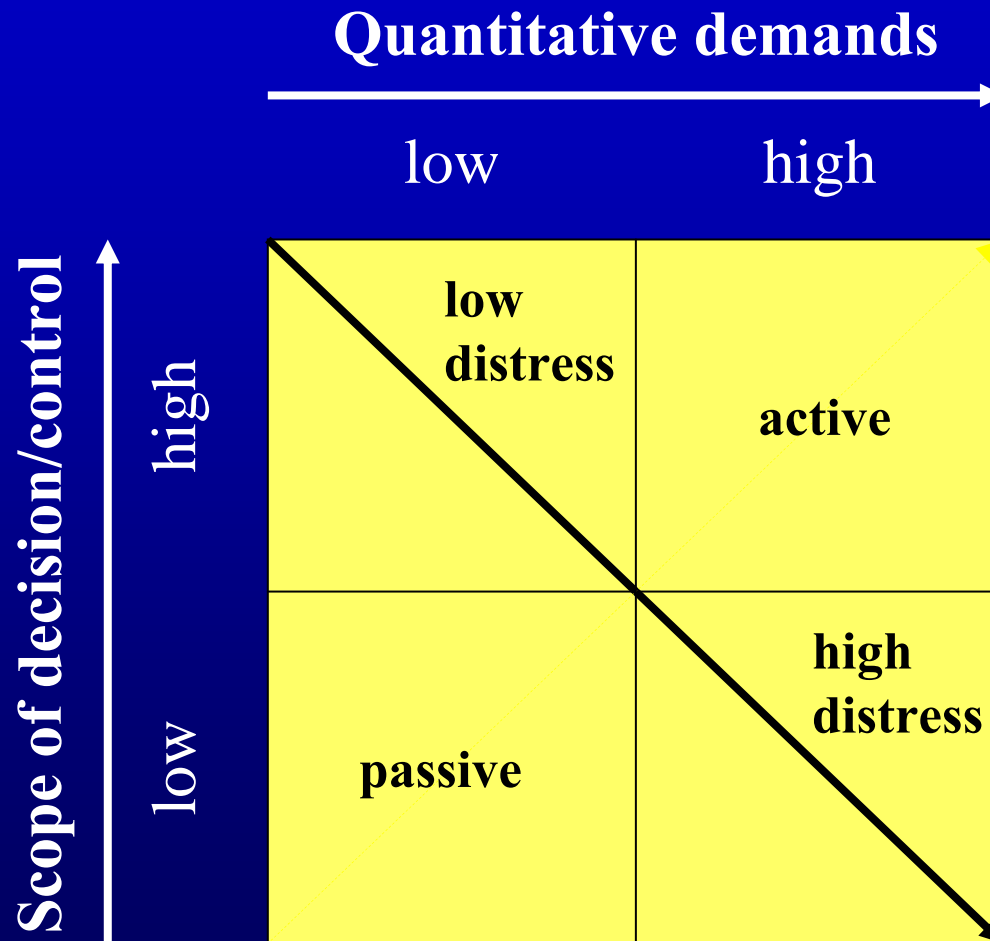
- social support at work
- demand-control
- effort-reward imbalance

# The model of social support at work (J.S. House 1981; J. Johnson & E. Hall 1988)



# The demand-control model

(R. Karasek 1979; R. Karasek & T. Theorell 1990)



# The model of effort-reward imbalance at work

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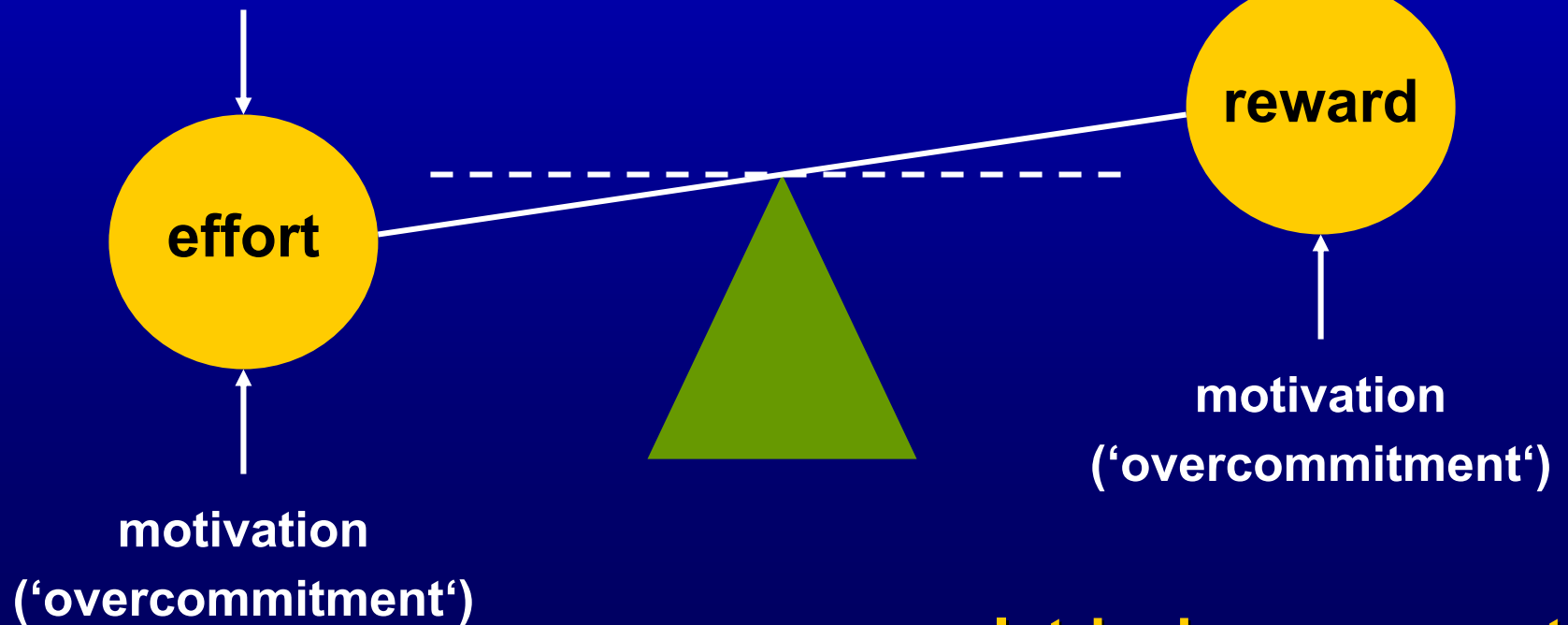
- Focus on **employment contract** (salary, esteem, status)
- Rooted in general principle of cooperative exchange: **social reciprocity**
- Combines aspects of the **work environment** ('extrinsic') and the **working person** ('intrinsic')
- Has **policy implications** for health promotion through **contractual fairness**
- Can be applied to **other types of role-related cooperative exchange**

# The model of effort-reward imbalance (J. Siegrist 1996)

## Extrinsic components

- labour income
- career mobility / job security
- esteem, respect

demands / obligations



Intrinsic component

# Why do people continue to work in ,high cost – low gain‘ conditions?

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- **Dependency**

The working person has **no alternative choice** in the labour market: accepting contractual unfairness is preferred to job loss.

- **Strategic choice**

The working person accepts imbalance in order to **improve future career development** (anticipatory investment).

- **Overcommitment**

The working person exhibits a **motivational pattern** of excessive work-related commitment where investments often exceed gains. Overcommitment is either due to **personality** or due to **pressure at work**.

# Hypotheses

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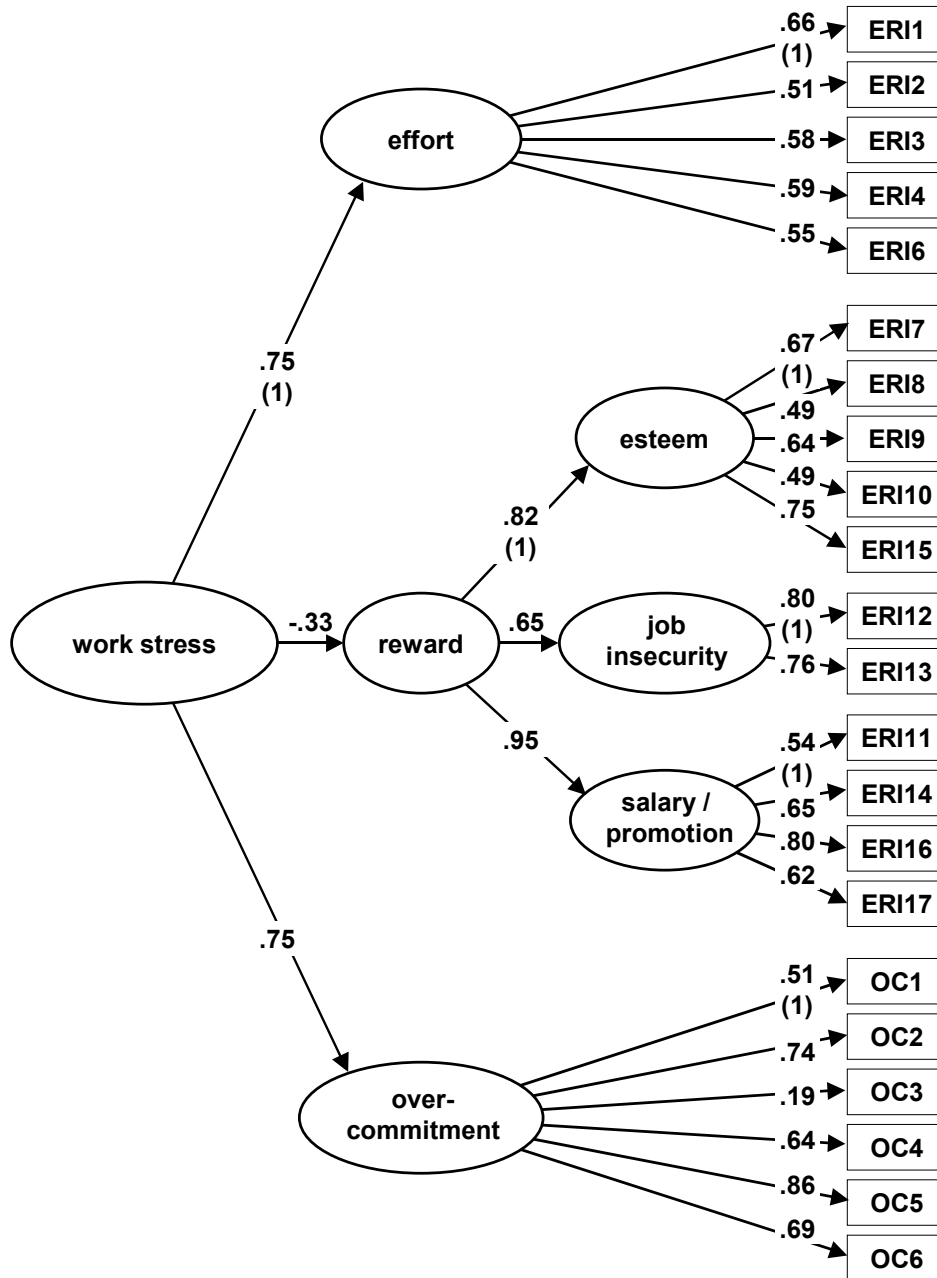
1. People characterized by an **imbalance between (high) effort and (low) reward** (failed reciprocity) are at elevated risk of stress-related diseases (over and above the risk associated with each one of the components).
2. People **scoring high on ,overcommitment‘** are at elevated risk of stress-related diseases.
3. Relatively highest risk of stress-related diseases is expected in people who are characterized by the **co-manifestation of conditions (1) and (2)**.

# Measurement of effort-reward imbalance at work

- Scale *,effort'* (6 Likert-scaled items) = perceived demands (Cronbach's  $\alpha = .72$ )
- Scale *,reward'* (11 Likert-scaled items) = experienced or promised gratifications (Cronbach's  $\alpha = .83$ )
  - 3 subscales: (a) salary and promotion, (b) esteem, (c) job security
  - *,ratio effort/reward'* =  
sum score *,effort'* / (sum score *,reward'*  $\times$  6/11)
- Scale *,overcommitment'* (6 Likert-scaled items) = pattern of coping with demands and rewards (Cronbach's  $\alpha = .76$ )

For detailed information see:

# Results of CFA



**N=666 German employees  
(representative sample)**

$\chi^2/df$	2,99
<b>GFI</b>	.91
<b>AGFI</b>	.89
<b>CFI</b>	.90
<b>RMSEA</b>	.06

Source: A. Roedel et al. (2004),  
ZDDP, 25: 227-238.

# Globalized economy: major features

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- Development of a **single global market** of money and goods dominated by multinational cooperations in the three centres (role of WTO, WB, IMF)
- Neoliberalism: **trade liberalization**, decreasing impact of state policies, welfare cuts, reduced impact of trade unions
- Rapid **transfer of technologies, information flow**, and trade of services (,Westernization‘)
- Increased **mobility and forced migration** (labour market, tourism, political upheaval)

# **Globalized economy: major impact on work and employment**

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- **Increased job instability and unemployment  
(mergers, downsizing, outsourcing)**
- **Segmentation of labour market  
(disparities in quality of work and income)**
- **Increased competition  
(reduced social support and solidarity)**
- **De-standardization of work contracts  
(flexible work, fixed-term contracts, homework etc.)**

# How does globalization affect work stress in terms of the effort-reward imbalance model?

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## Increased effort

- elevated work intensity/work pressure
- extension of weekly working hours, shortening of recovery periods (including holidays)
- increase of irregular work schedules
- rapid pace of adaptations to new tasks, new teams and new work environments

## Reduced reward

- increased job insecurity
- higher risk of downward mobility, forced early retirement
- lack of promotion prospects, reduced salary/wage or bonuses
- disinvestment in social capital (decline in culture of justice, fairness, and esteem)

## **II. Scientific evidence**

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**Focus on coronary heart disease and depression**

**„By the year 2020 depression and coronary heart disease will be the leading causes of premature death and of life years defined by disability (DALY's) worldwide.“**

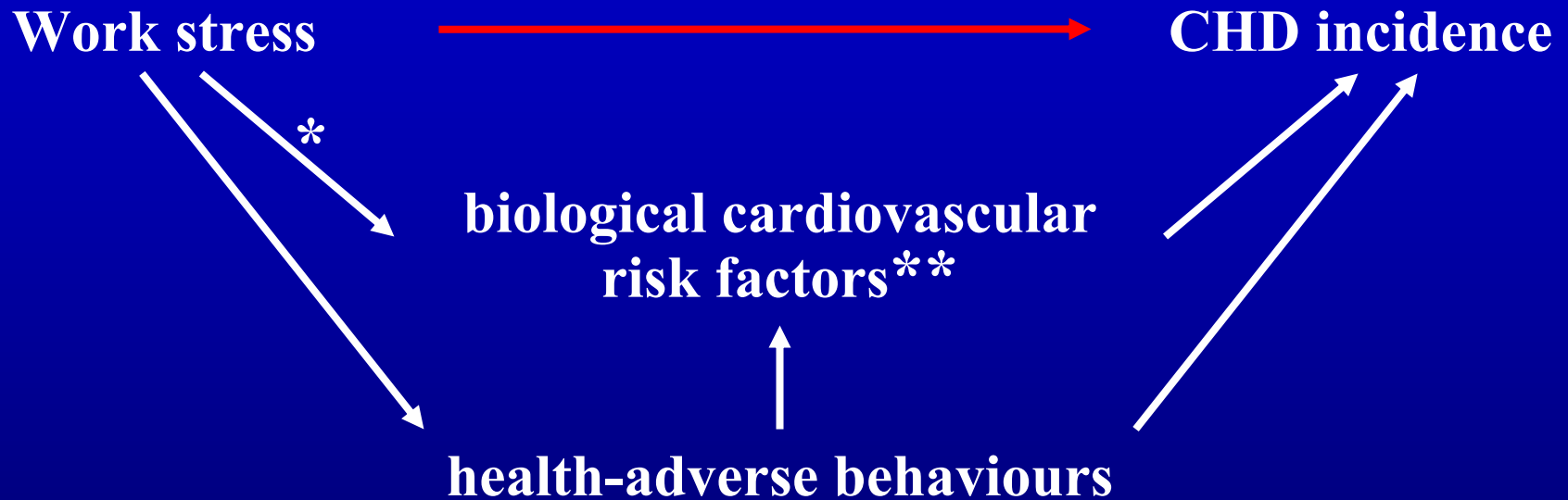
**(Murray and Lopez 1996)**

# Effort-reward imbalance at work and health: recent reviews

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- **Tsutsumi A & Kawakami N (2004).**  
A review of empirical studies on the model of effort–reward imbalance at work: reducing occupational stress by implementing a new theory.  
*Soc Sci Med*, 59: 2335–59.
- **van Vegchel N, de Jonge J, Bosma H & Schaufeli W (2005).**  
Reviewing the effort–reward imbalance model: drawing up the balance of 45 empirical studies.  
*Soc Sci Med*, 60: 1117-31.

# Direct and indirect effects of work stress on coronary heart disease (CHD)



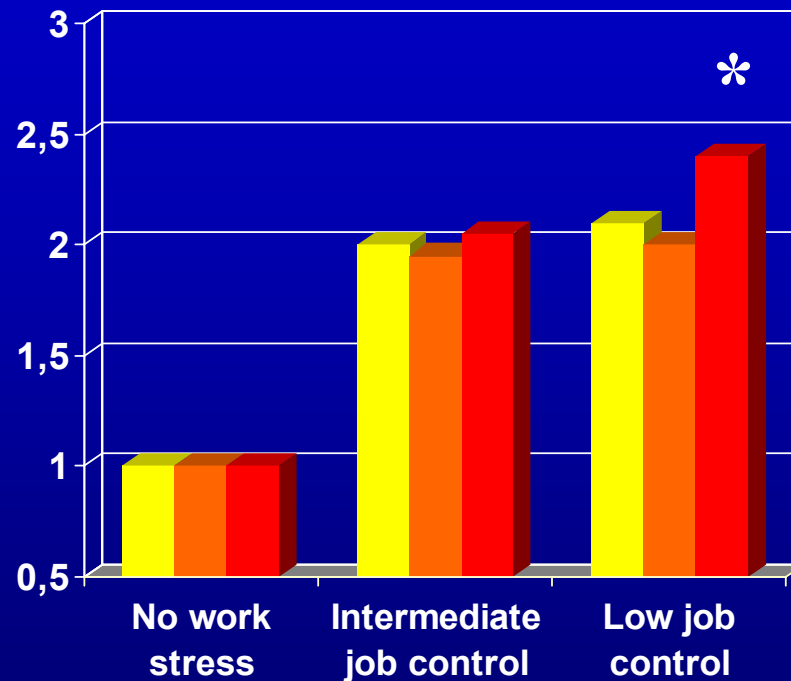
\* psychophysiological mechanisms, e.g.

- enhanced cv activity
- altered cortisol excretion
- enhanced inflammatory responses

\*\* e.g.

- hypertension
- hyperlipidaemia
- elevated fibrinogen

# Work stress (effort reward imbalance/job control) and CHD incidence, men and women: Whitehall II-Study

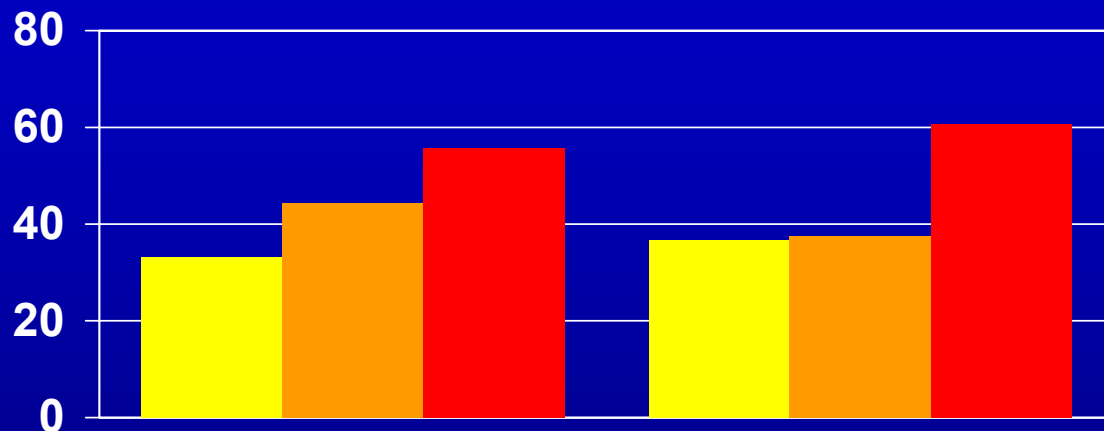


- adjusted for age, sex, length of follow-up
- + alternative work stress model
- + grade, coronary risk factors, negative affect

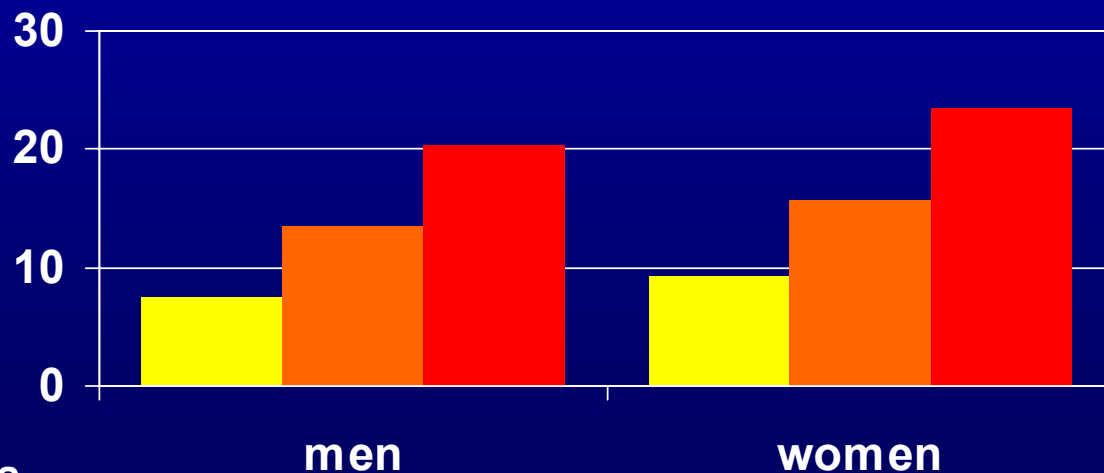
\* p < .05

# Prevalence of psychosocial work stress according to social grade: Whitehall II-Study

**Effort-reward imbalance model:**  
% imbalance between effort and reward



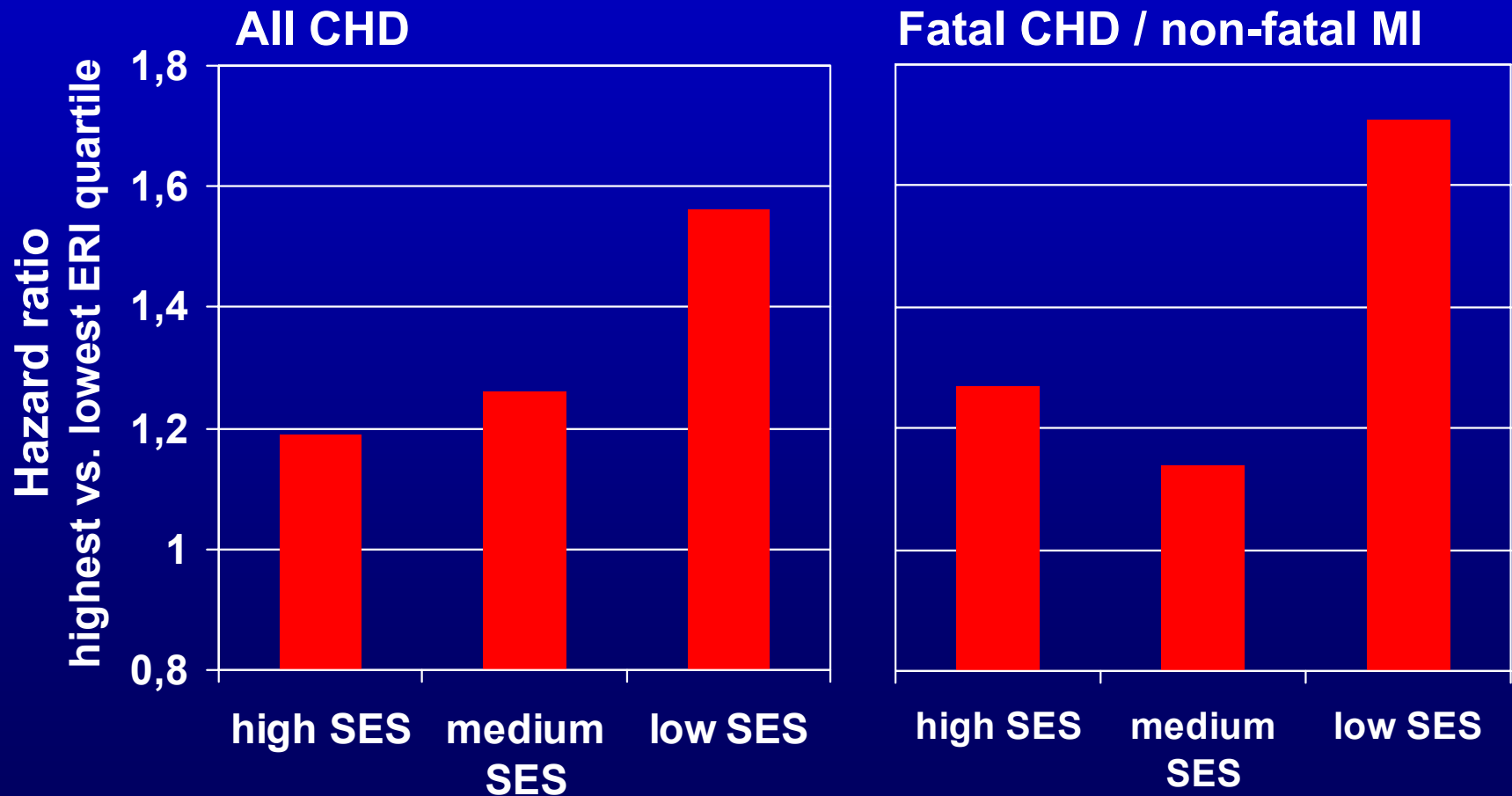
**Demand-control model:**  
% job strain (observer judgement)



■ high,  
■ middle,  
■ low occupational status

# Effect modification of the association between the effort-reward ratio and CHD by SES

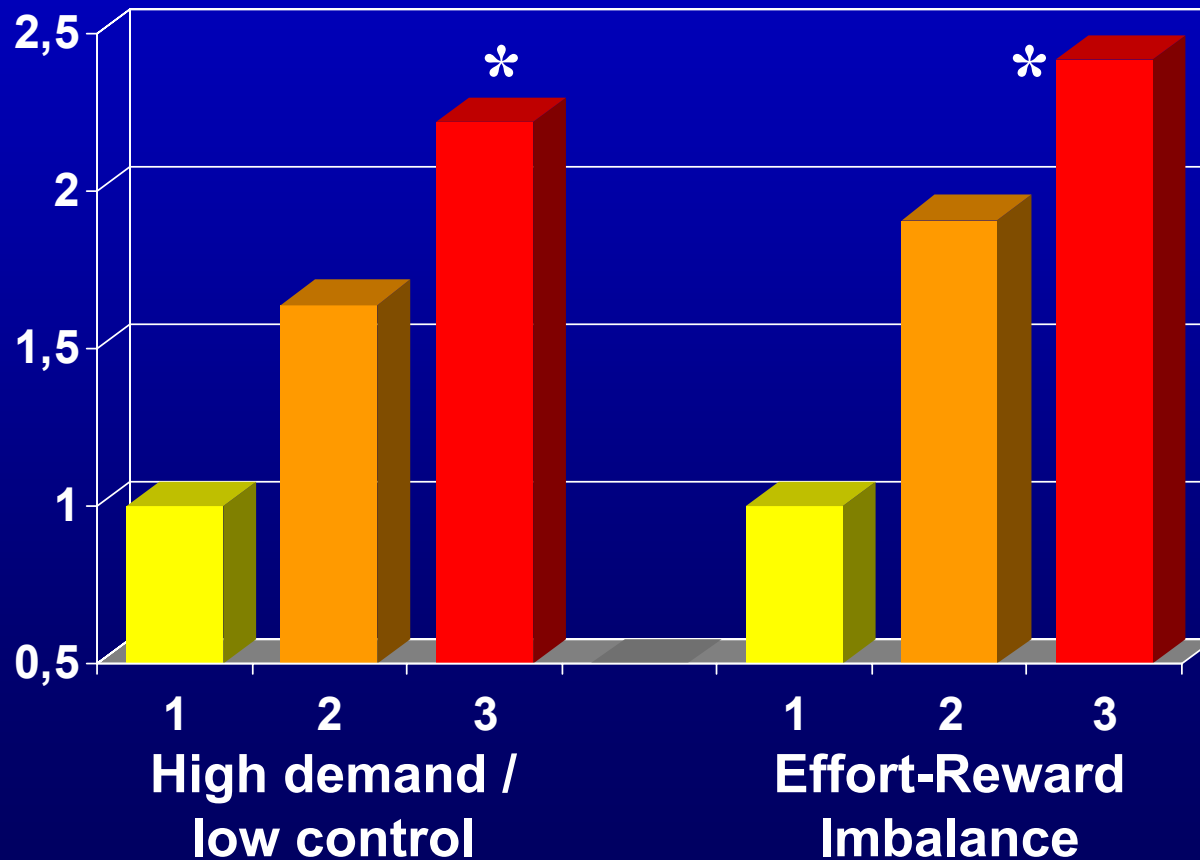
Whitehall II-Study; 11 year follow-up  
(N=10,308 male and female civil servants)



Source: H. Kuper et al. (2002), *Occ Environ Med*, 59: 777-784.

# Adjusted hazard ratios for cardiovascular mortality by levels of work stress<sup>#</sup>

Nmax=812 (73 deaths); mean follow-up 25,6 years

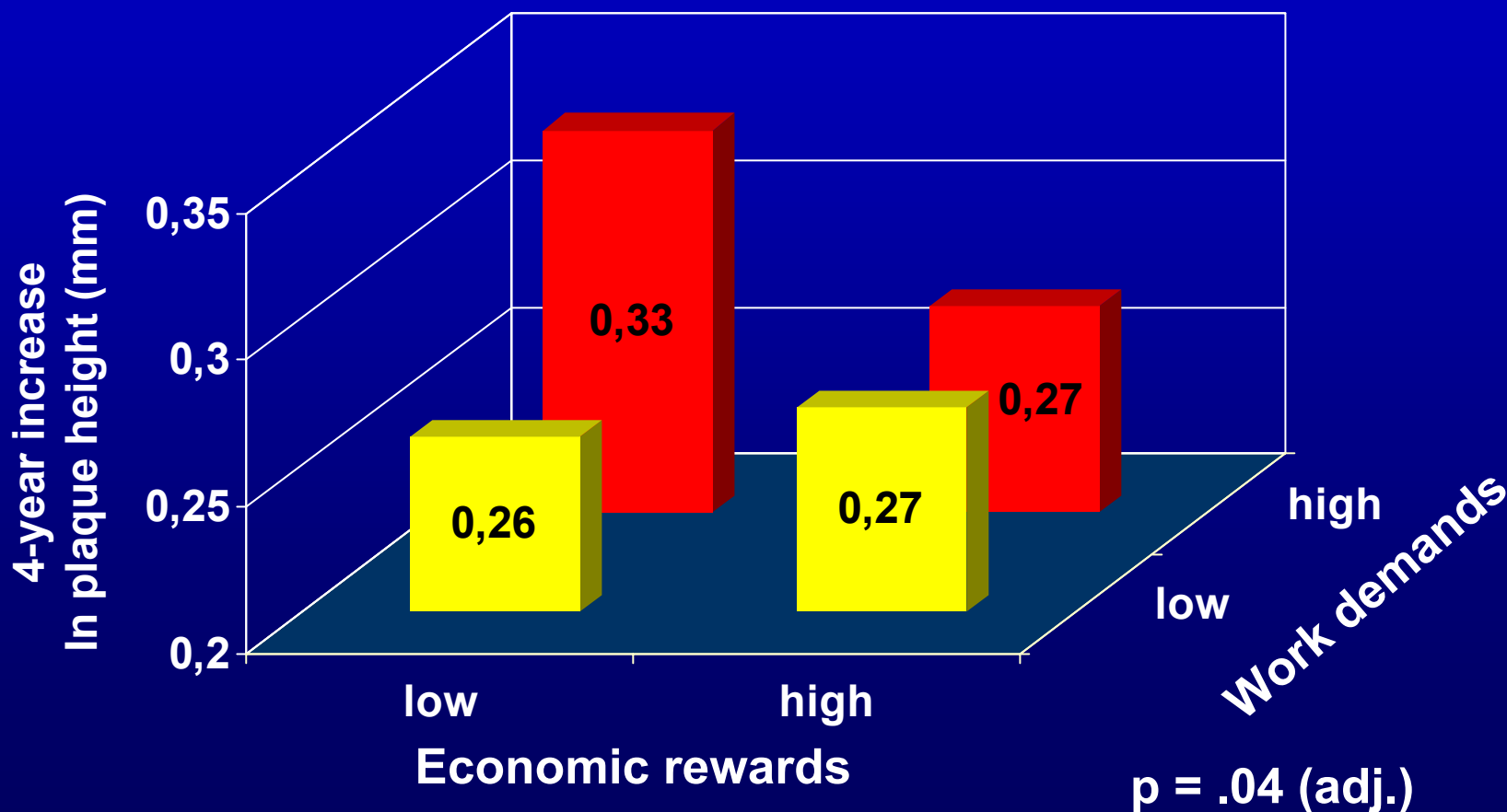


Tertiles  
1 = low;  
2 = intermediate;  
3 = high

<sup>#</sup>adj. for age, sex,  
occupational group,  
smoking, physical  
activity, SBP,  
total chol., BMI

\* p < .05

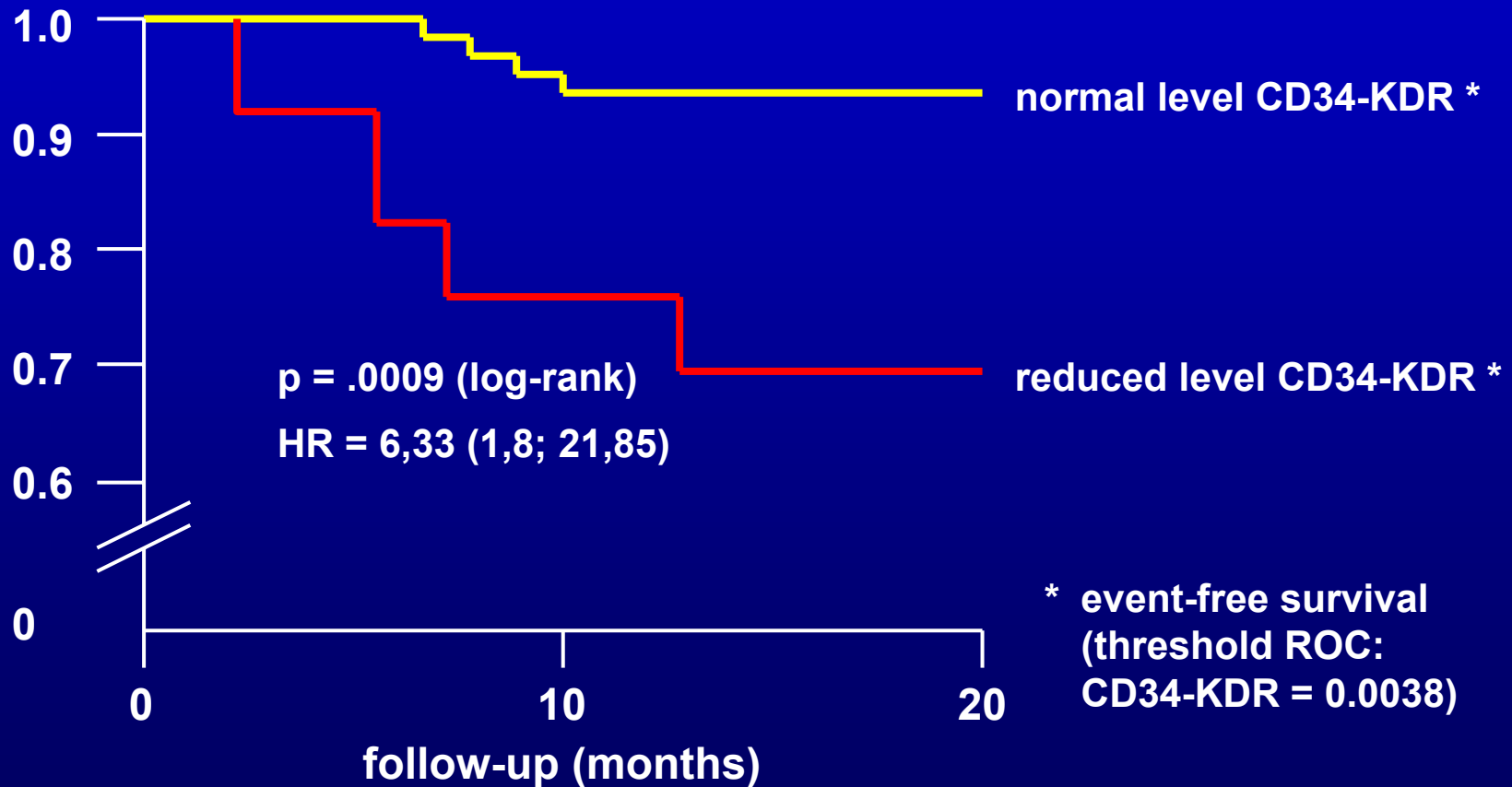
# Workplace demands, economic reward, and 4-year progression of carotid atherosclerosis (plaque height) in 940 Finnish men



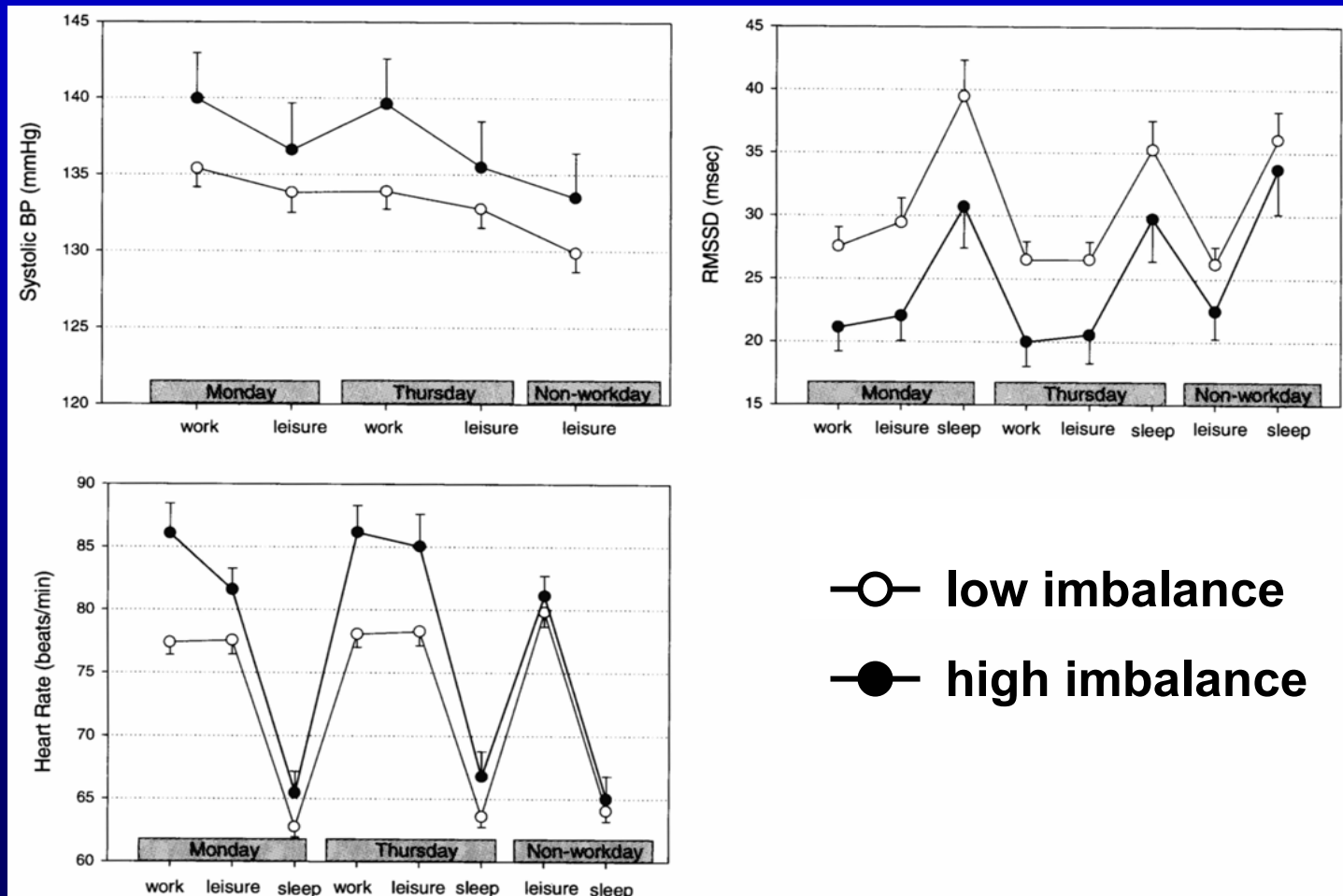
Source: J. Lynch et al. (1997), Circulation, 96: 302

# Reduced number of circulating endothelial progenitor cells and cardiovascular disease risk

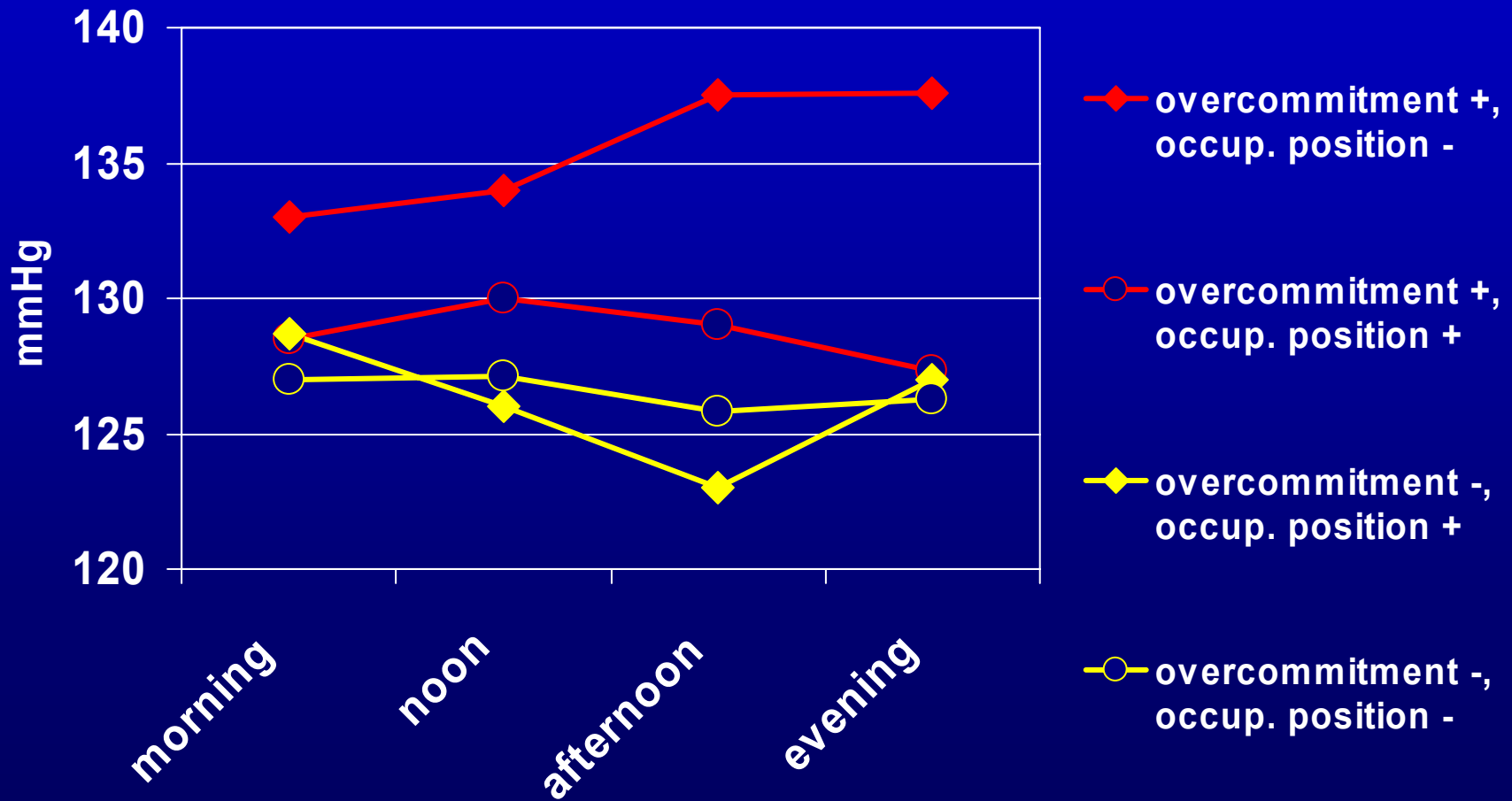
(N=120 patients und controls)



# Ambulatory BP, HR and HR variability and work stress (effort-reward imbalance)



# Mean systolic blood pressure (mmHg) in men over a working day according to overcommitment and occupational position (N=105)



Source: A. Steptoe et al. (2004), Psychosomatic Medicine, 66: 323-329.

# Psychosocial stress and hypertension among working women in Beijing

(N=421 ♀; 38,8±8,1 yrs.)

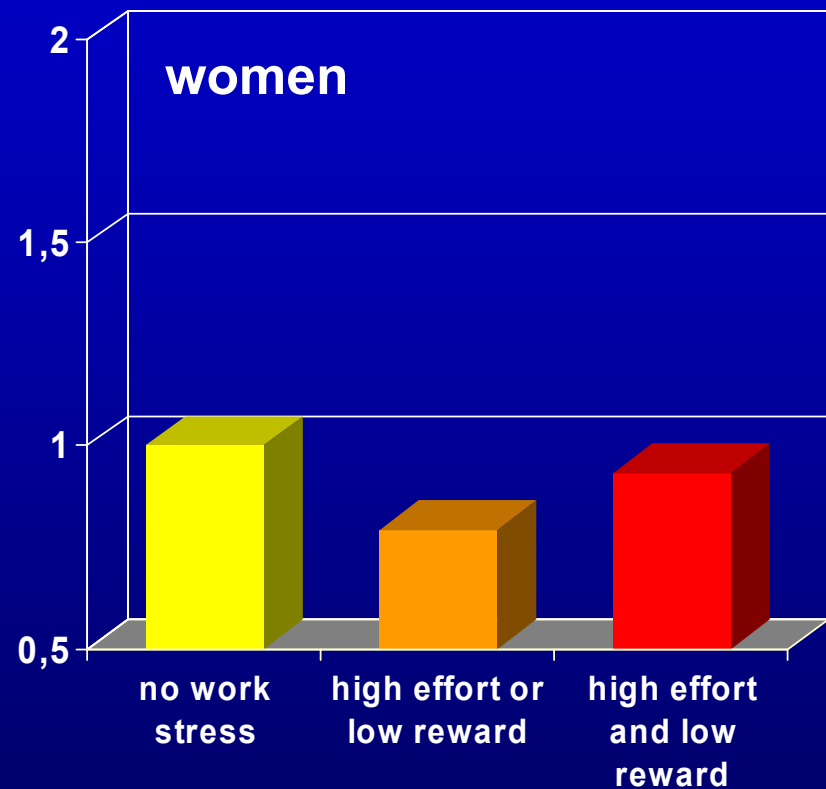
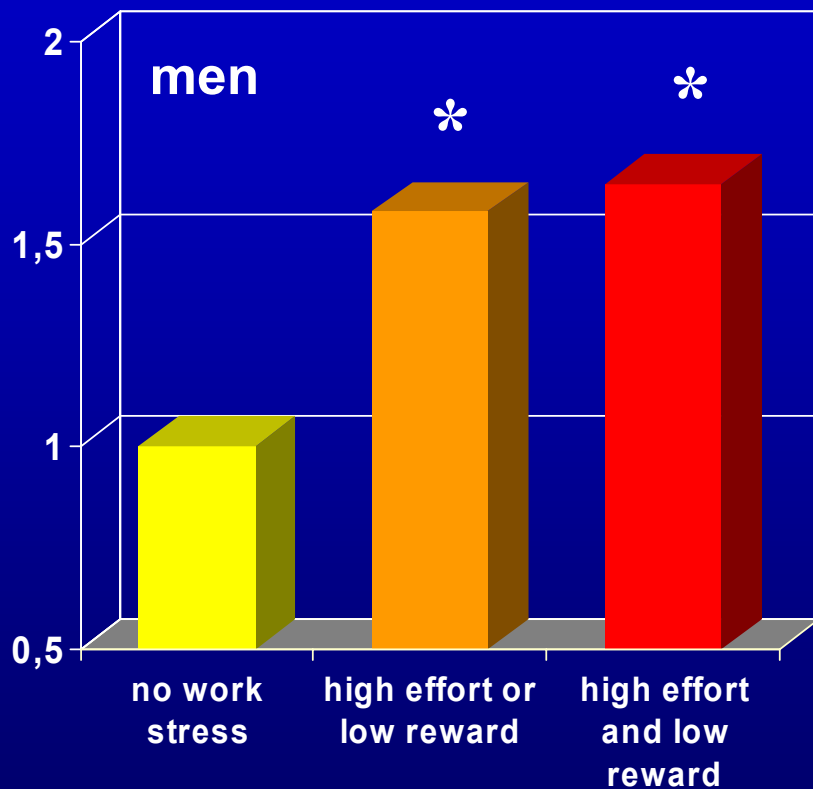
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	Multivariate prevalence odds ratio of hypertension	
<b>Low reward</b>	<b>3.09</b>	<b>(1.21 - 7.92)</b>
<b>Low job variety</b>	<b>3.05</b>	<b>(1.49 - 6.27)</b>
<b>Conflict between work and family</b>	<b>3.79</b>	<b>(1.19 - 3.95)</b>
<b>Smoking</b>	<b>2.17</b>	<b>(1.19 - 3.90)</b>
<b>BMI ≥ 25</b>	<b>7.29</b>	<b>(3.71 - 14.37)</b>

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# Effort-reward imbalance and incident type 2 diabetes in the Whitehall II-Study

(odds ratios<sup>#</sup>; N=8067, mean follow-up: 12.5 years)

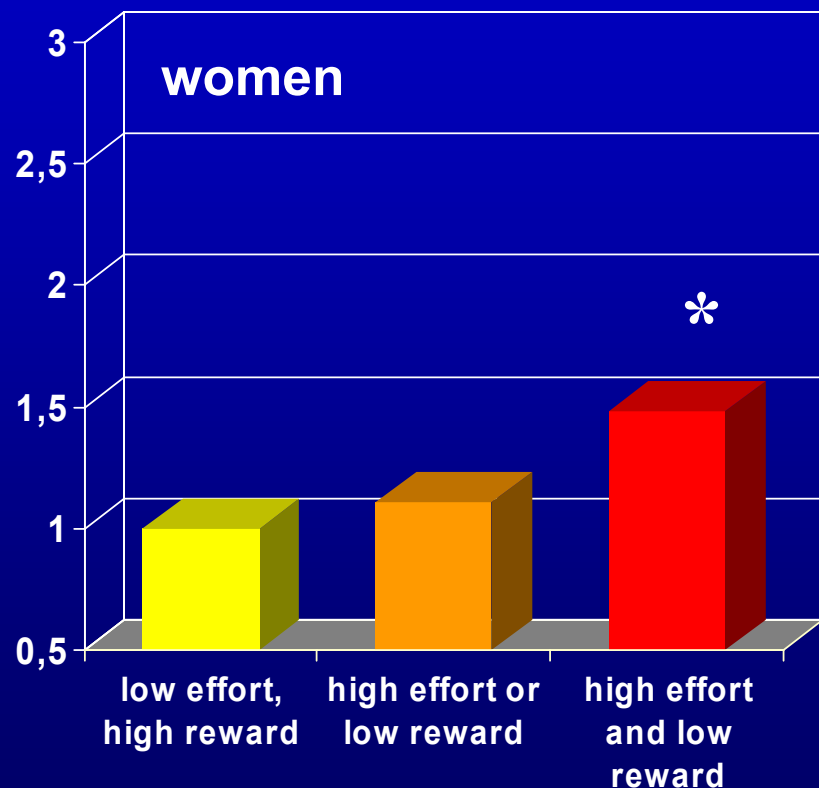
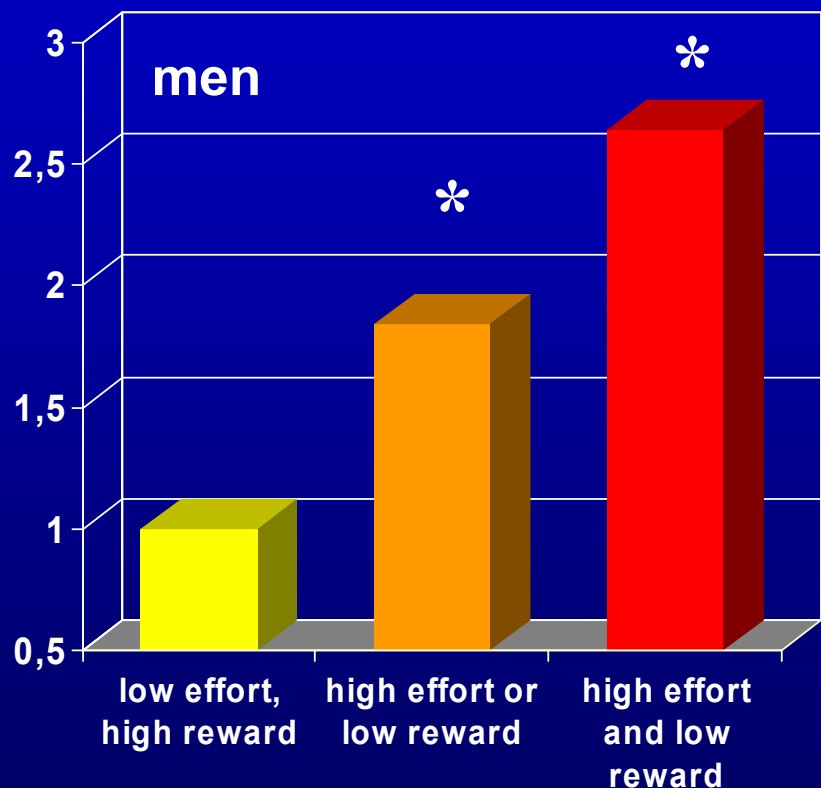


<sup>#</sup> adjusted for age, employment grade, ethnic group, length of follow up, ECG abnormalities, family history of diabetes, BMI, height, SBP, exercise, smoking, life events

Source: A. Kumari et al. (2004), Arch Intern Med, 164: 1873-80.

# Effort-reward imbalance

## and psychiatric disorder (GHQ): Whitehall II-Study (odds ratios<sup>#</sup>; N=6110, follow-up: 5.3 years)



# adjusted for age, employment grade, baseline GHQ score

Source: S.A. Stansfeld et al. (1999), *Occup Environ Med*, 56: 302-7.

# Association of work stress with depression (CES-D scale) in Japanese employees threatened by job instability (N=160)

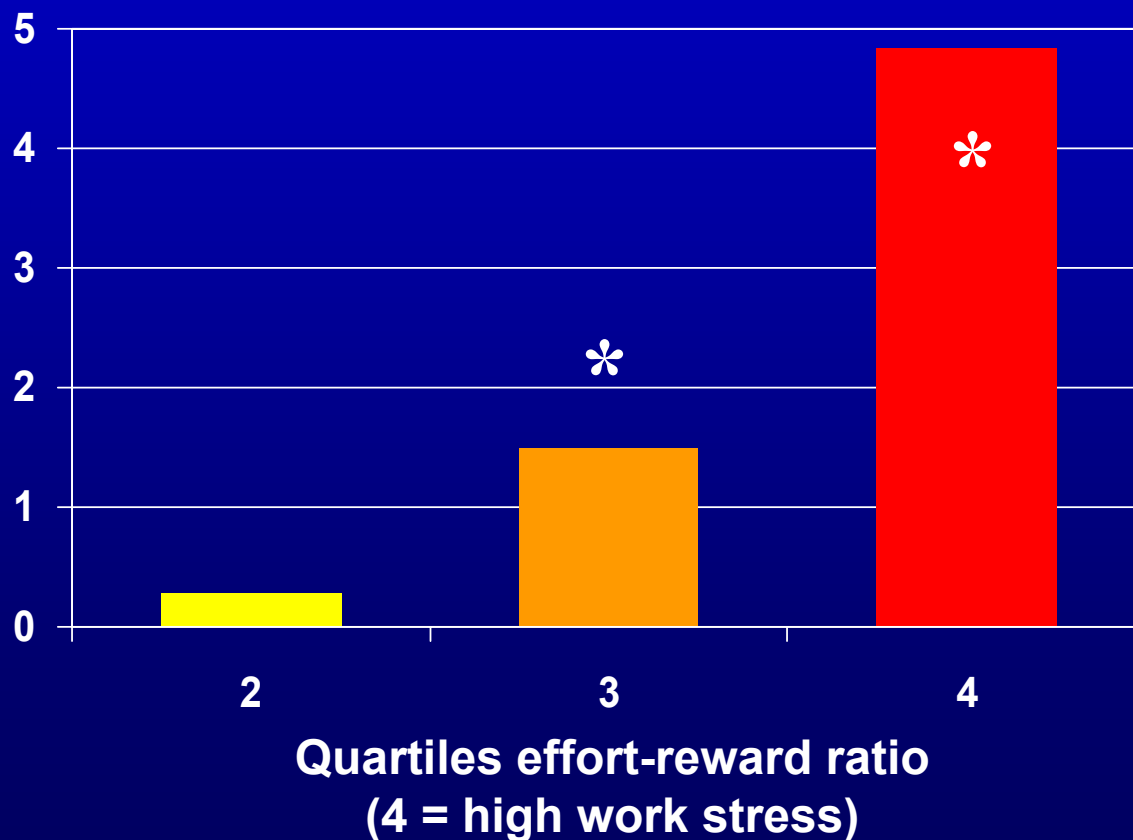
	OR*	95% CI	p
High demand	0,83	0.32 - 2.15	.70
<b>Low control</b>	<b>4.71</b>	<b>1.16 - 13.72</b>	<b>.00</b>
Job strain	2.16	0.85 - 5.51	.10
<b>Ratio effort/reward</b>	<b>4.13</b>	<b>1.39 - 12.28</b>	<b>.01</b>
<b>Overcommitment</b>	<b>2.56</b>	<b>1.01 - 6.47</b>	<b>.05</b>

\*adj. for age, sex, job status, job type and respective job characteristics

Source: A. Tsutsumi et al. (2001), Scand J Work Environ Health, 27: 149.

# Effort-reward imbalance and depressive symptoms (CES-D): HAPIEE Study (urban population of 3 Eastern European countries; N=1168 men and women, 45-64 yrs.)

Mean increase in CES-D score<sup>#</sup> compared to quartile 1 (no work stress)



Range CES-D: 0-60

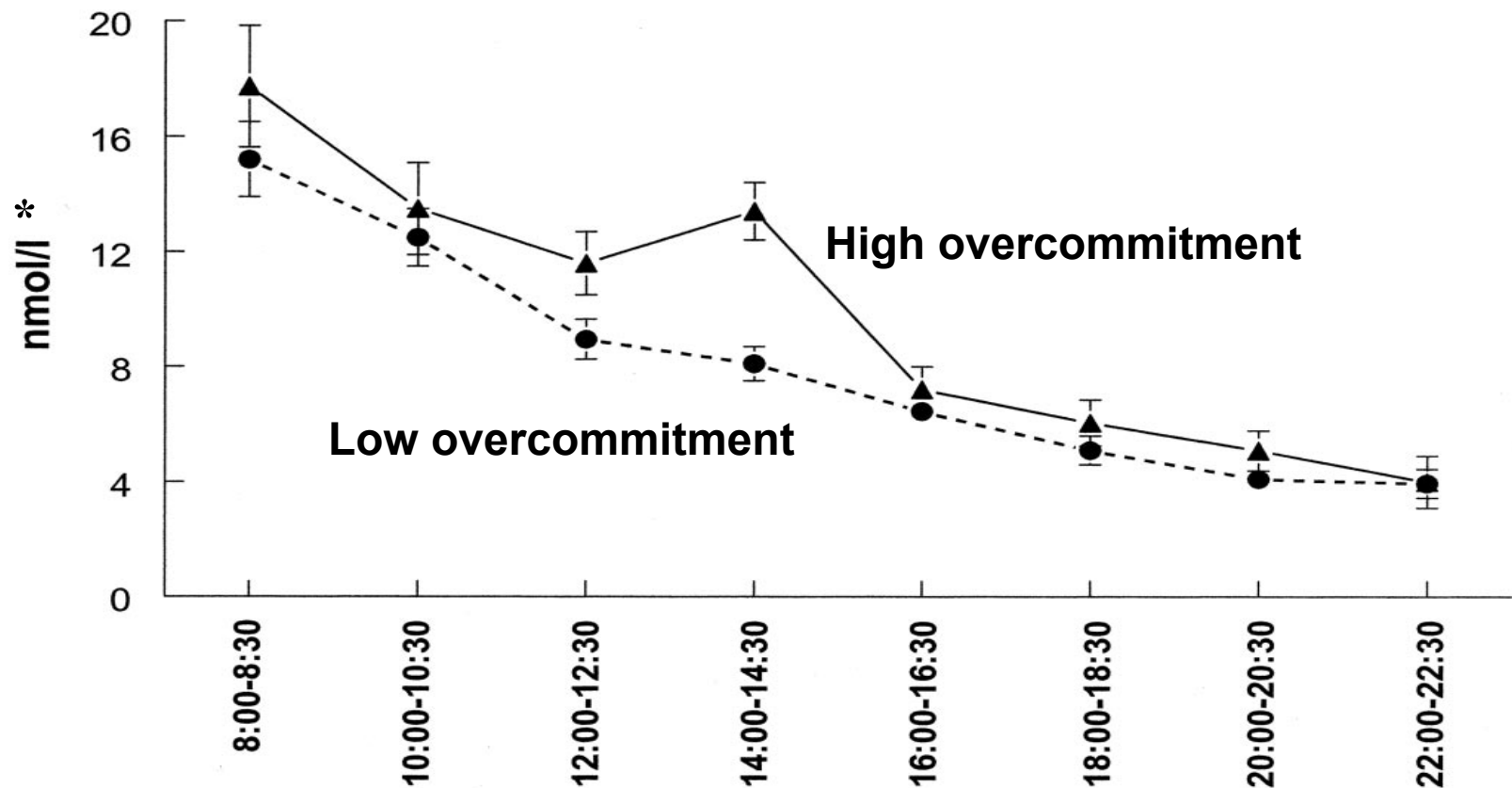
mean CES-D: 12.07

<sup>#</sup>adj. for age, sex, area

\* p < .05

Source: H. Pikhart et al. (2004), Soc Sci Med, 58: 1475-1482.

# Cortisol excretion over the working day in healthy male employees (Whitehall II-Study; N=105)



\*adj. for age, SES, smoking, waking time

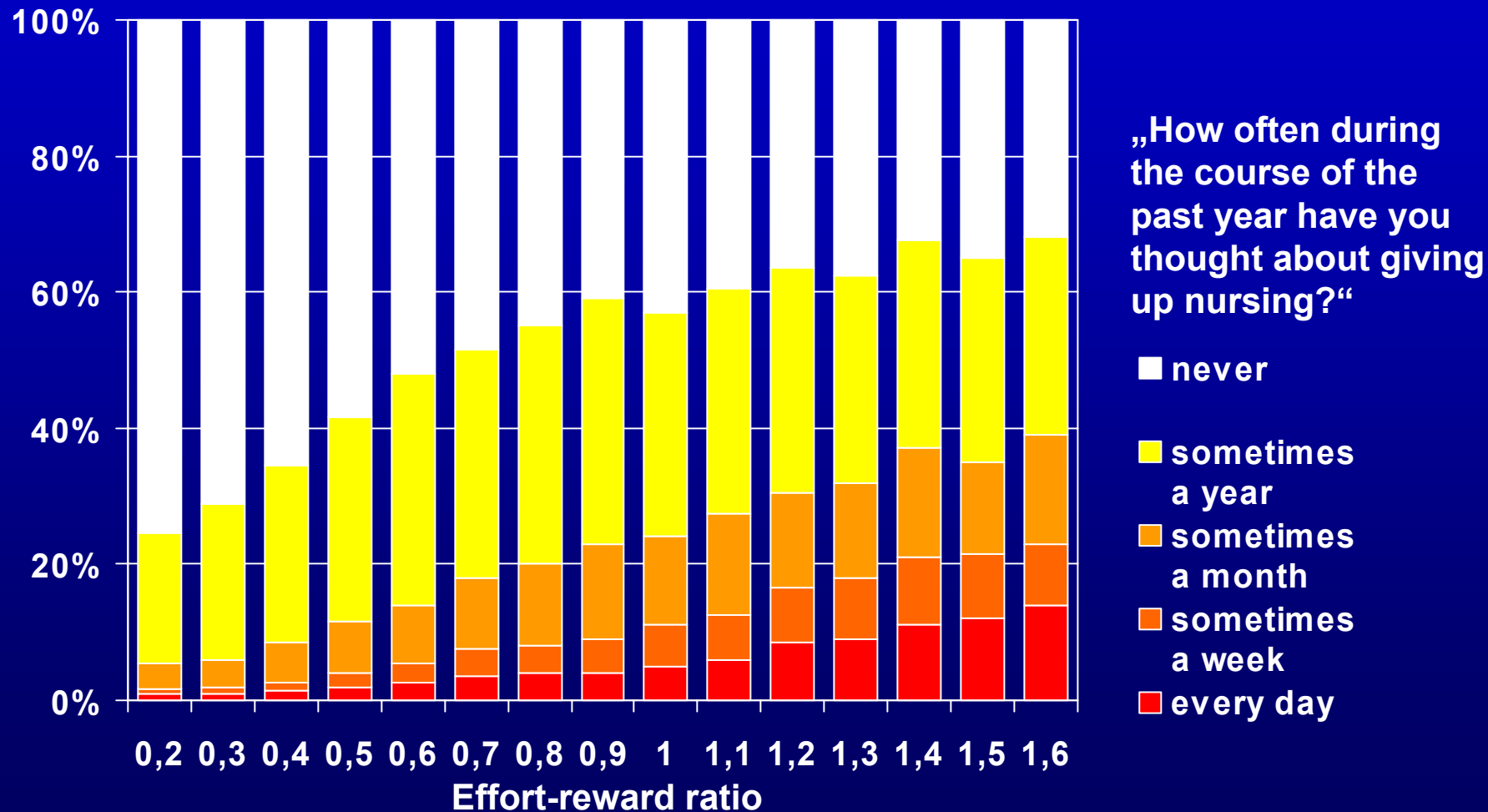
# Symptom load and effort-reward imbalance at work: effect of organisational downsizing (BIBB Study; N=22,559)

Odds ratios of manifest work-related symptoms in a 0.1 % sample of the German work force

		Men (n=12.240)	Women (n=10.319)
Downsizing	NO	1	1
ERI	NO		
Downsizing	YES	1.53 [1.30-1.79]	1.71 [1.43-2.06]
ERI	NO		
Downsizing	NO	3.06 [2.75-3.41]	3.26 [2.91-3.65]
ERI	YES		
<b>Downsizing</b>	<b>YES</b>	<b>4.41 [3.75-5.18]</b>	<b>5.37 [4.45-6.47]</b>
<b>ERI</b>	<b>YES</b>		

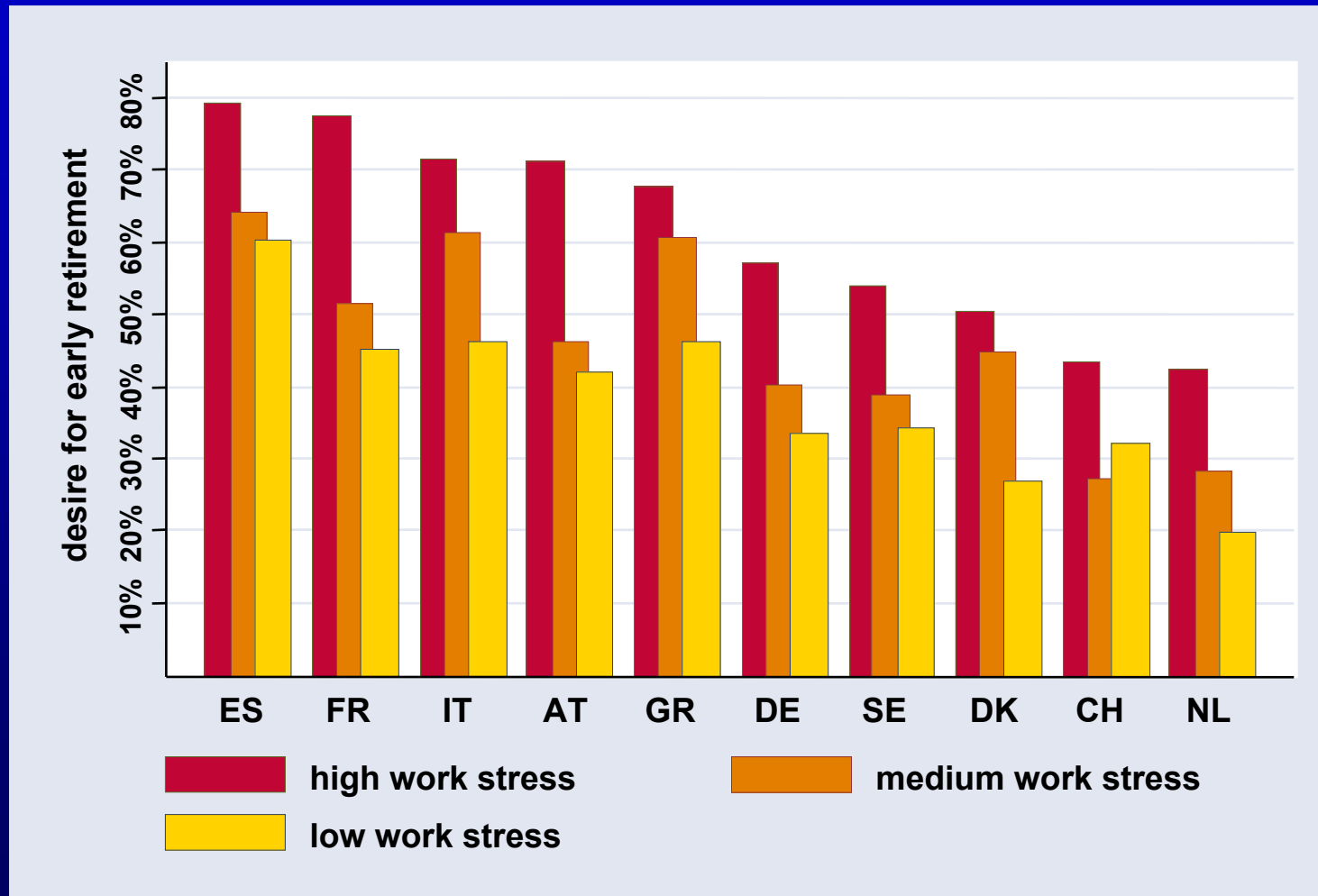
Source: N. Dragano et al. (2005), J Epidemiol Commun Health, 59: 694-699.

# ERI and intention to leave nursing (NEXT Study; N=21,729)



Source: adopted from HM Hasselhorn et al. (2004).

# Work stress (effort-reward imbalance) and the desire for early retirement (SHARE Study; N=6,524)



# Work-home balance and health: testing spill-over effects on depressive symptoms (N= 316 employees of a transport company)

## Spill-over effects and depressive symptoms: odds ratios and confidence intervals

	OR	95% CI	
<b>work-family spill-over</b>			
model I*	4.04	2.28; 7.14	
model II**	2.64	1.08; 6.45	* adj. for age and sex
<b>family-work spill-over</b>			
model I*	4.20	2.09; 8.44	**adj. for age, sex, SES, shift work, ERI, emotional support, alternative spill-over
model II**	3.77	1.36; 10.46	

Source: O.v.d. Knesebeck et al. (2004) in M. Kastner (ed.), Die Zukunft der Work Life Balance. Kröning.

# Extending the model of effort-reward imbalance beyond work

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- Hypothesis:  
Failed reciprocity in terms of efforts spent and rewards received in significant social roles **outside paid work** is associated with elevated risk of stress-related diseases.
- Core social roles outside paid work include **marital and parental roles** and **roles in civic life** including post retirement work.

# III. Policy implications:

## 3 levels of worksite health promotion

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- **Person:**

Coping as strengthening of the individual's competence of problem solving

- **Group:**

Cooperation and handling of conflicts, collective assertion, leadership training

- **Organisation:**

Changes at the level of work organization (organizational and personnel development) including training/qualification

# **Structural intervention measures derived from the model of effort-reward imbalance at work**

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- **Compensatory wage differentials**
- **Models of gain-sharing**
- **Flexible time arrangements**
- **Incentives for esteem / recognition**
- **Enhanced leadership skills (managers)**
- **Promotion prospects according to achievements**
- **Job security**

# **Seven practices of successful organizations: reconciling health promotion with economy**

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- 1. Employment security**
- 2. Selective hiring of new personnel**
- 3. Self-managed teams; decentralization of decision making**
- 4. Comparatively high compensation contingent on performance**
- 5. Extensive training**
- 6. Reduced status distinctions and barriers**
- 7. Extensive sharing of financial and performance information**

**Source: J. Pfeffer (1998). The Human Equation: Building Profits by Putting People First. Boston: Harvard Business School.**

# Policy measures at transnational level

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- **Inform and motivate professional groups and decision makers to reduce science-policy gap (e.g. ICOH, ILO, WHO)**
  - **ILO:** Tripartite declaration on multinational enterprises and social policy
  - **European Commission:** Promoting a European framework for corporate social responsibility. Green Paper 2001
  - **OECD:** Guidelines for multinational enterprises
  - **WHO:** Commission on social determinants of health (ongoing)
- **Create incentives for investments into improved quality of work (,healthy organizations‘; models of good practice)**
- **Improve / harmonize legal standards of workers‘ protection including measures of contractual fairness**