EU-OSHA Seminar on psychosocial risks in Europe
Brussels, 16-17 October 2014

Managing stress and psychosocial risks at work

Johannes Siegrist, Ph.D.
Senior Professor of Work Stress Research
University of Duesseldorf, Germany
Main Questions

• Can we reliably define and measure ‘stress at work’?

• Does stress at work matter for health and productivity?

• How can the impact of stress at work be separated from other sources of stress?

• Are there examples of effective interventions of stress reduction at work?

• How can national policies support actions at company level?
Increased pressure of rationalisation
(mainly due to wage competition)

Downsizing, Merging, Outsourcing

Work
intensification

Job
insecurity

Low wage /
salary
Increase in work intensity 2004-2010: European Social Survey, 19 EU countries

Work Intensity Scores (0-5) 2004-2010

Source: Gallie D (Ed.) (2013) ESS Topline Results Series 3, European Social Survey
Job insecurity 2004-2010
European Social Survey, 19 EU countries

Figure 4 Job Insecurity among All Employees and Temporary Workers 2004-2010

Source: Gallie D (Ed.) (2013) ESS Topline Results Series 3, European Social Survey
Main work stressors and their consequences

- Work pressure, overtime work
- Job insecurity
- Monotony, low control
- Poor leadership
- Discrimination, bullying
- Unfair pay
- Disrupted work-life balance

- Productivity losses
- Absenteism
- Stress-related disorders
1. Can we reliably define and measure 'stress at work'?

Stress occurs if a person is exposed to a threatening demand (stressor) that taxes or exceeds her/his capacity of successful response → risk of loss of control and reward

Dimensions of stress reactions:
- Cognitive evaluation of threat
- Negative emotions (anxiety, anger)
- Activation of stress axes in organism (SAM, HPA)
- Behavioural reaction (fight or flight) (restricted option!)

Critical for health:
- Chronic stressors requiring active coping → allostatic load; → risk of stress-related disorders (depression, CHD)
Theoretical models of work stress and evidence of adverse health effects
The demand-control model
(R. Karasek 1979; R. Karasek & T. Theorell 1990)

Psychometric scale of demand-control model: www.jcqcenter.org
The model of effort-reward imbalance (J. Siegrist 1996)

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

Intrinsic component
- motivation
  (‘overcommitment’)

Psychometric scale of effort-reward model: www.uniklinik-duesseldorf.de/med-soziologie
Confirmatory factor analysis: Replication of the theoretical model (effort-reward imbalance)

N=666 employed men and women

χ²/df  2.99
GFI  .91
AGFI  .90
CFI  .89
RMSEA  .06

Measurement of work stress models

Standardized self-administered questionnaires, available in main languages across EU

- Psychometrically validated scales
  - reliability, sensitivity to change
  - discriminant validity
  - criterion validity
  - specificity and sensitivity of thresholds

- Partial validation by observational / administrative data

- Construction of job exposure matrices (DC model)

- More information on measurement:
  - DC model: www.jcqcenter.org
  - ERI model: www.uniklinik-duesseldorf.de/med-soziologie
  - COPSOQ model: www.arbejdsmiljoforskning.dk
Mean level of work stress in 17 European countries (SHARE, ELSA, n = 14 254, aged 50-64)

Psychosocial Working Conditions

Source: T. Lunau et al. (2013): Unpublished results
Sensitivity and specificity of ERI scales: 
Cut-point of the ER-ratio


Figure 1. Distribution of ERI ratio in the diseased and non-diseased group (N = 115 vs. N = 187). The horizontal line indicates the cut-off point ERI > 0.751. It can easily be seen from the figure that a higher cut-off point would lead to a higher rate of misclassifications of diseased subjects, meaning a loss in sensitivity.
2. Does stress at work matter for health and productivity?

Three sources of evidence:

- Experimental and naturalistic studies: monitoring stressful situations and physiological reactions
- Epidemiological cohort studies of initially healthy employees: exposure to stress > elevated relative risk of stress-related disease
- Intervention studies: Reducing stress at work and evaluating effects on health and wellbeing
Mean ambulatory blood pressure (low control vs. high control).

N = 227 men and women (47-59 years); Whitehall Cohort Study

Work stress (ERI) and natural killer cells in 347 Japanese employees

High demand / low control  
High effort / low reward

Tertile (work stress):
1 = no
2 = low
3 = high

*adj. for age, sex, SEP, smoking, phys. act., SBP, cholest., and BMI

Psychosocial stress at work and depressive symptoms: 13,128 employed men and women 50-64 yrs. from 17 countries in three continents (SHARE, ELSA, HRS, JSTAR)

USA (N=1560)  
Europa (N=10342)  
Japan (N=1226)

Cumulative hazard curves of disability pension due to depression by quartile of work stress (ERI) (n = 51,874)

3. How can the impact of stress at work be separated from other sources of stress?

Population- attributable risk (PAR):

Answer to the question:

What proportion of all cases of a specific disease occurring in a population can be attributed to work stress?

Data base:

- Prevalence of the disease (e.g. depression: 8 %)
- Prevalence of exposure (work stress) (e.g. 25%) (Pe)
- Relative risk (DC or ERI) (e.g. RR=2.0 for depression)

Population-attributable risk: \( \text{PAR}=\frac{\text{Pe} \times (\text{RR}-1)}{1+\text{Pe}(\text{RR}-1)} \)

for depression: 15 – 20 %
for coronary heart disease: 5-10 %
4. Are there examples of effective interventions of stress reduction at work?

- **Personal level**: Stress prevention programs
- **Interpersonal level**: Leadership training; communication skills;
- **Structural level**: Organizational/personnel development (based on work stress models)
  - Job enrichment/ enlargement (autonomy, control, responsibility)
  - Skill utilization / active learning
  - Participation / team work and social support
  - Culture of recognition
  - Fair wages/ gain-sharing
  - Continued qualification/ promotion prospects
**Personal level: Effects of worksite stress prevention programs: Meta-analysis**

### Perceived stress

<table>
<thead>
<tr>
<th>Study</th>
<th>Weight %</th>
<th>θ, 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brinkborg.2011</td>
<td>13.06%</td>
<td>-0.72 [-1.13, -0.31]</td>
</tr>
<tr>
<td>Eriksen.2002</td>
<td>15.56%</td>
<td>-0.05 [-0.23, 0.13]</td>
</tr>
<tr>
<td>Kawakami.2006</td>
<td>14.56%</td>
<td>0.13 [-0.16, 0.42]</td>
</tr>
<tr>
<td>Shimazu.2005</td>
<td>14.68%</td>
<td>-0.06 [-0.33, 0.22]</td>
</tr>
<tr>
<td>Takao.2006</td>
<td>14.44%</td>
<td>-1.16 [-1.46, -0.87]</td>
</tr>
<tr>
<td>Tsai.1993</td>
<td>13.79%</td>
<td>-0.41 [-0.76, -0.06]</td>
</tr>
<tr>
<td>Umanodan.2009</td>
<td>13.90%</td>
<td>-0.41 [-0.76, -0.07]</td>
</tr>
<tr>
<td><strong>RE Model</strong></td>
<td>100.00%</td>
<td>-0.37 [-0.71, -0.04]</td>
</tr>
</tbody>
</table>

**Interpersonal level**: Leadership training of managers and stress hormone excretion in subordinates

<table>
<thead>
<tr>
<th></th>
<th>Intervention group</th>
<th></th>
<th>Control group</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Baseline</td>
<td>After 1 year</td>
<td>Baseline</td>
<td>After 1 year</td>
</tr>
<tr>
<td>Mean Cortisol (nmol/l)</td>
<td>387.2</td>
<td>345.2</td>
<td>* 390.4</td>
<td>391.3</td>
</tr>
<tr>
<td>Mean decision latitude (range 2-8)</td>
<td>6.0</td>
<td>6.1</td>
<td>** 6.2</td>
<td>5.7</td>
</tr>
</tbody>
</table>

Interaction group X time: *p = .05, **p = .02

### Structural – level: Organizational intervention in a Canadian hospital vs. control hospital*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Means at t2 adj. for t0</th>
<th></th>
<th></th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demand</td>
<td>11.9</td>
<td>12.6</td>
<td>.008</td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>70.0</td>
<td>68.7</td>
<td>.051</td>
<td></td>
</tr>
<tr>
<td>Social support</td>
<td>23.7</td>
<td>23.0</td>
<td>.011</td>
<td></td>
</tr>
<tr>
<td>Reward</td>
<td>31.2</td>
<td>30.2</td>
<td>.003</td>
<td></td>
</tr>
<tr>
<td>Effort-reward imbal.</td>
<td>1.0</td>
<td>1.1</td>
<td>.001</td>
<td></td>
</tr>
<tr>
<td>Work-rel. burnout</td>
<td>43.2</td>
<td>48.3</td>
<td>.003</td>
<td></td>
</tr>
</tbody>
</table>

*36 month-follow-up, two Canadian hospitals, N=248 (intervention) vs. 240 (control hospital) (ANCOVA, adj. for baseline values)

5. How can national policies support company action? Association of work stress with national ALMP

Odds ratios of depressive symptoms by work stress according to labour protection policies

Based on SHARE, HRS, ELSA; n = 5650, m/w aged 50-64. 13 countries

Thank you!