



Finnish Institute of  
Occupational Health

WELL-BEING  
THROUGH WORK

# Improving recovery in 24/7 working life

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# 24/7 society

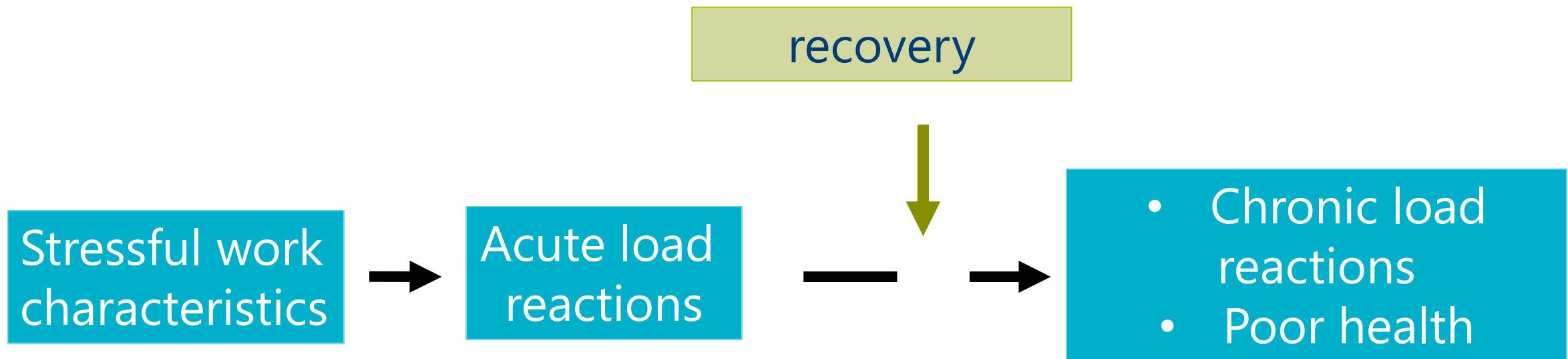
## Time

- **fragmentation** of time
- **intensification** of time
- **stretching** of time

## Work

- shift work and irregular working hours
- haste and stress
- overtime and long working days

# Work, recovery and health



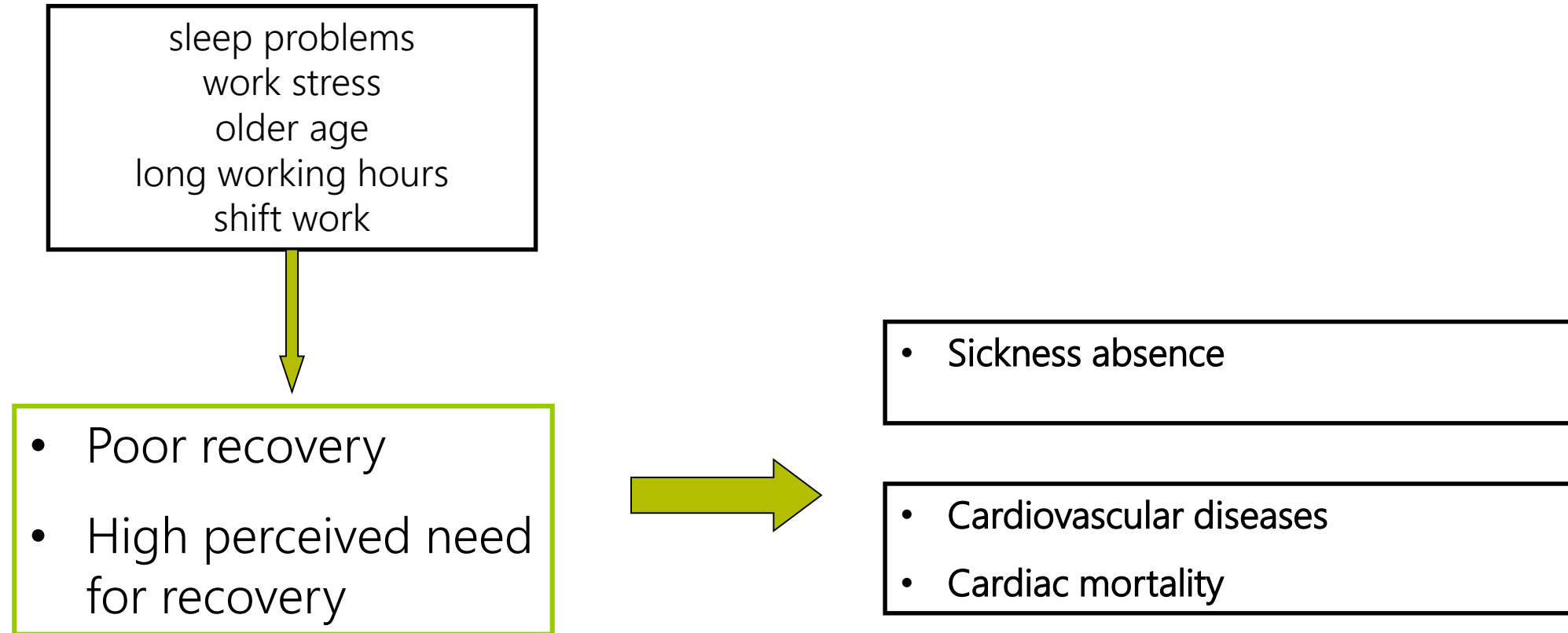
## **Article**

Scand J Work Environ Health [2006;32\(6\):482-492](#)

doi:10.5271/sjweh.1053

**Recovery as an explanatory mechanism in the relation between acute stress reactions and chronic health impairment**  
by [Geurts SAE, Sonnentag S](#)

# Successful recovery and wellbeing



Geurts ym. Scand J Work Environ Health 2006.  
Sluiter ym. Occup. Environ. Med. 2003.  
Van Amelsvoort ym. Occup Environ Med 2003.  
Croon ym. J Psychosom Res 2003.  
Kivimäki, et al., *Psychosom Med.*, 2006.

# Working time and work stress: Two important factors to recovery

## 1. Shift work /irregular working times

- Night shift work prevalence is 19 % in EU (European Working Conditions Survey (EWCS), 2010)

## 2. Work Stress

- About a quarter of employed are exposed to job strain (European Agency for Safety and Health at Work, 2009)

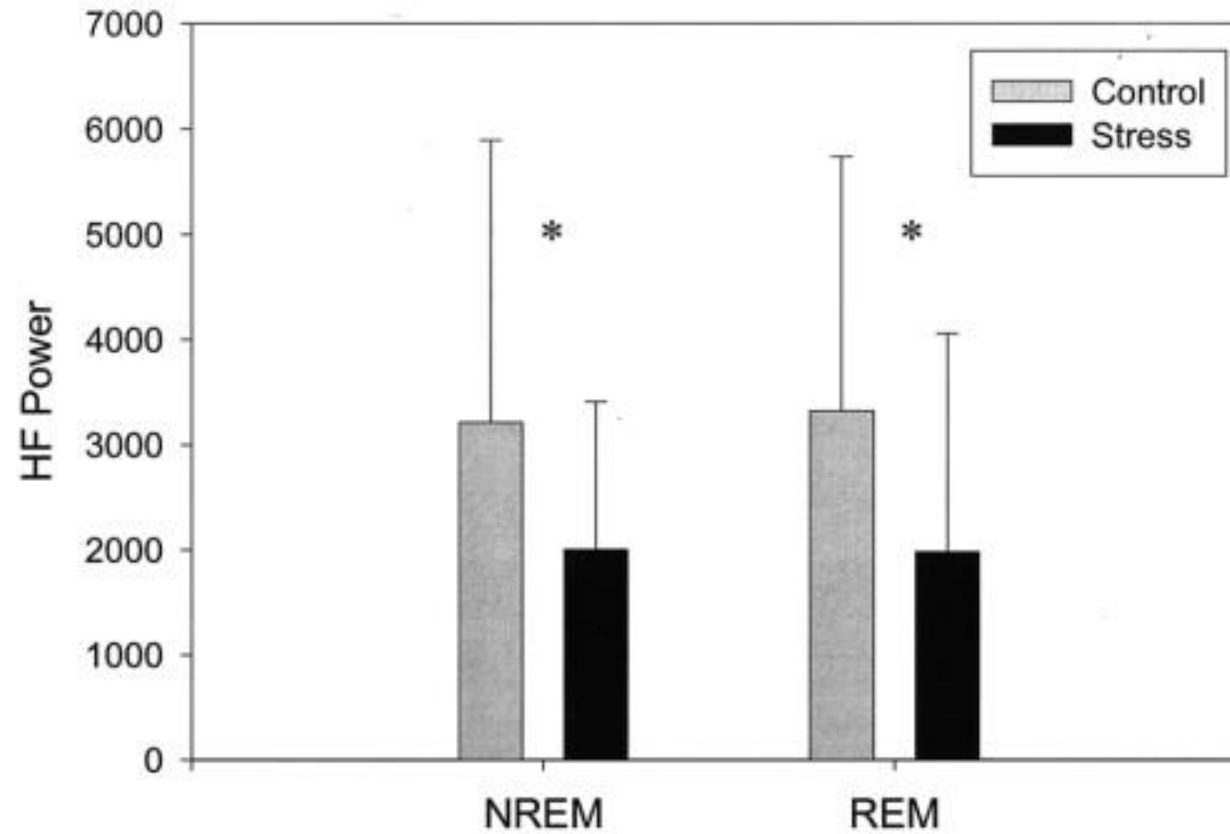
# Work stress

- Around 50% of all lost working days have some links with work stress (Cox, Griffiths, & Rial-Gonzalez, 2000)
- Work stress is associated with an increased heart rate, and decreased heart rate variability (Loof et al, 2018)
- Work stress increases cardiovascular disease risk (Kivimäki et al, Lancet 2015)

# Night shift work and health

Disease	Risk OR (95% CI)	reference
<i>Cancers</i>		
Breast cancer	1,32 (1,20–1,45)	Yuan ym. 2018 (14)
Digestive system cancer	1,18 (1,07–1,30)	Yuan ym. 2018 (14)
Colon cancer	1,32 (1,21–1,55)	Wang ym. 2015 (19)
Melanoma	1,41 (1,02–1,93)	Yuan ym. 2018 (14)
Prostate cancer	1,23 (1,08–1,41)	Gan ym. 2018 (15)
<i>Cardiovascular diseases</i>		
Coronary heart disease	1,26 (1,10–1,43)	Torquati ym. 2018 (23)
Type 2 Diabetes	1,09 (1,05–1,12)	Gan ym. 2015 (22)
Obesity	1,23 (1,17–1,29)	Sun ym. 2018 (20)
Hypertension	1,10 (1,00 –1,20)	Manohar ym. 2017 (21)

# Acute psychosocial stress disturbs recovery during sleep



## Acute Stress Affects Heart Rate Variability During Sleep

Psychosomatic Medicine 66:56–62 (2004)

MARTICA HALL, PhD, RAYMOND VASKO, PhD, DANIEL BUYSSE, MD, HERNANDO OMBAO, PhD, QINGXIA CHEN, MS, J. DAVID CASHMERE, BS, DAVID KUPFER, MD, AND JULIAN F. THAYER, PhD



# PSYCHOSOCIAL STRESS AND SLEEP

	N of studies	Strength of evidence	Conclusion
Job demands	9	---	High demand associates with poor sleep
Job control	10	++	High job control probably associates with good sleep
Social support	7	++	High social support at work probably associates with good sleep
Organisational justice	3	++	High Org. justice probably associates with good sleep
Effort /reward imbalance	3	--	Effort/reward imbalance probably associates good sleep

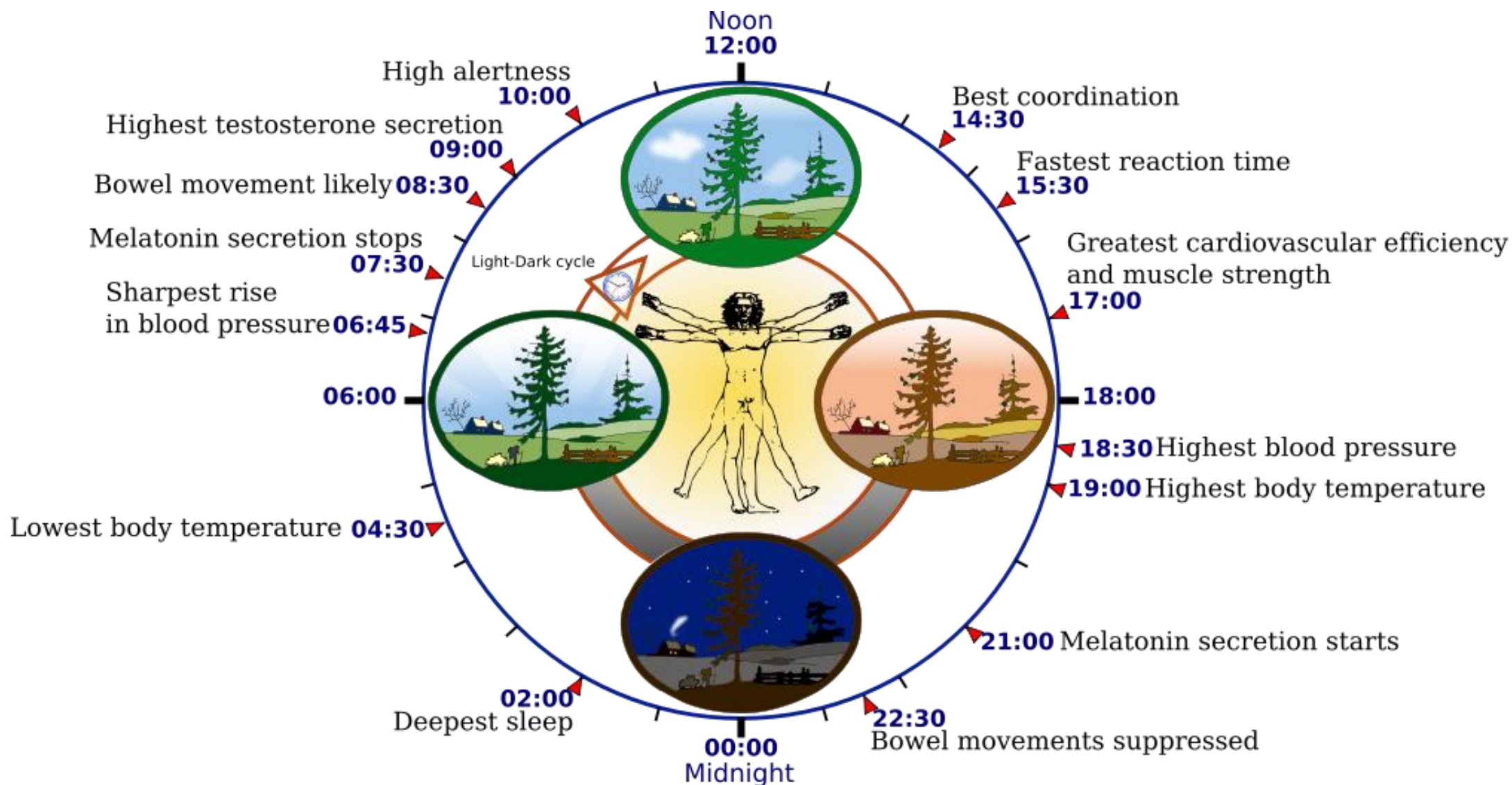


## Review

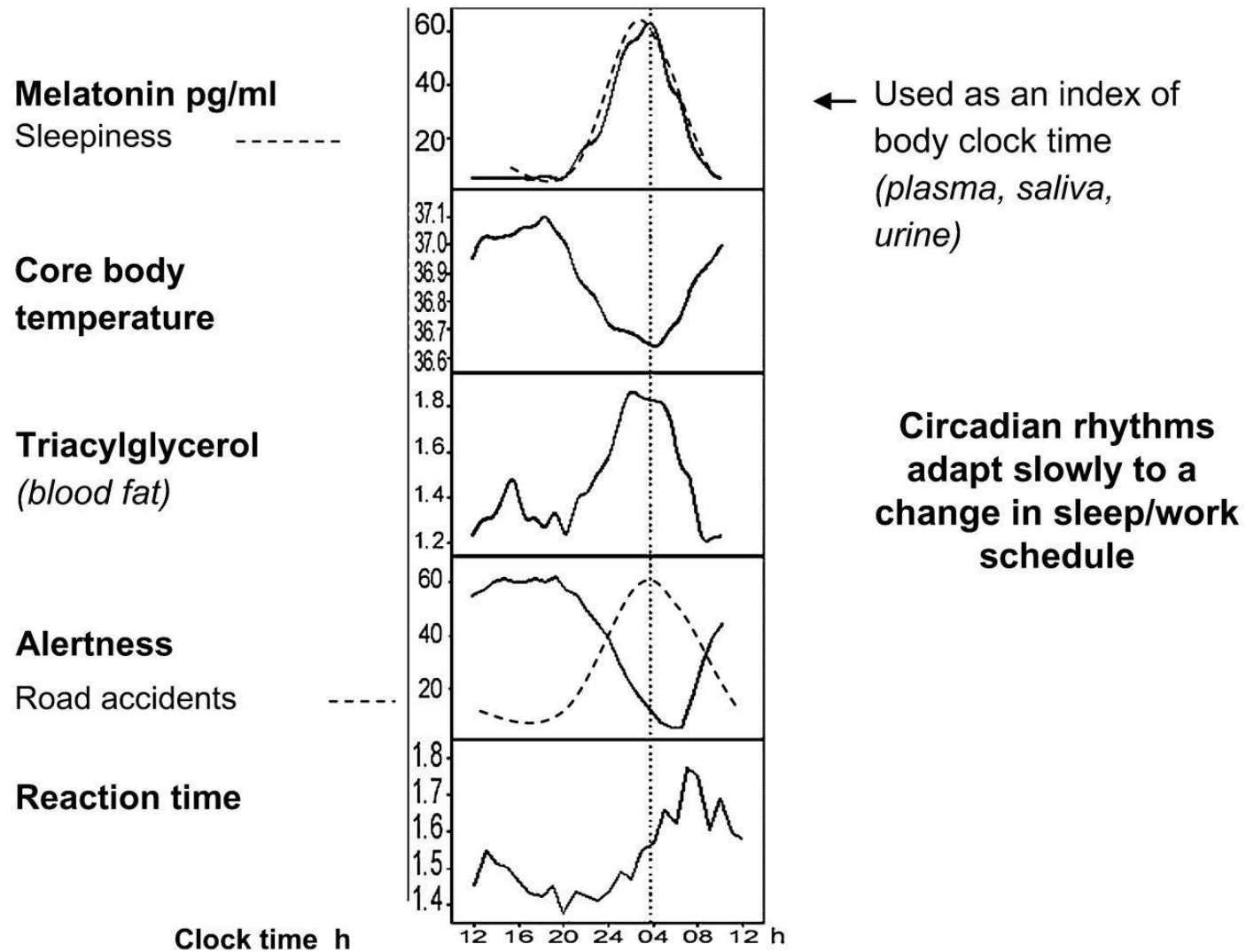
Scand J Work Environ Health [2013;39\(6\):535-549](#)  
doi:10.5271/sjweh.3376

**Psychosocial work characteristics and sleep quality: a systematic review of longitudinal and intervention research**  
by Van Laethem M, Beckers DGJ, Kompier MAJ, Dijksterhuis A, Geurts SAE

# Humans, a day active species

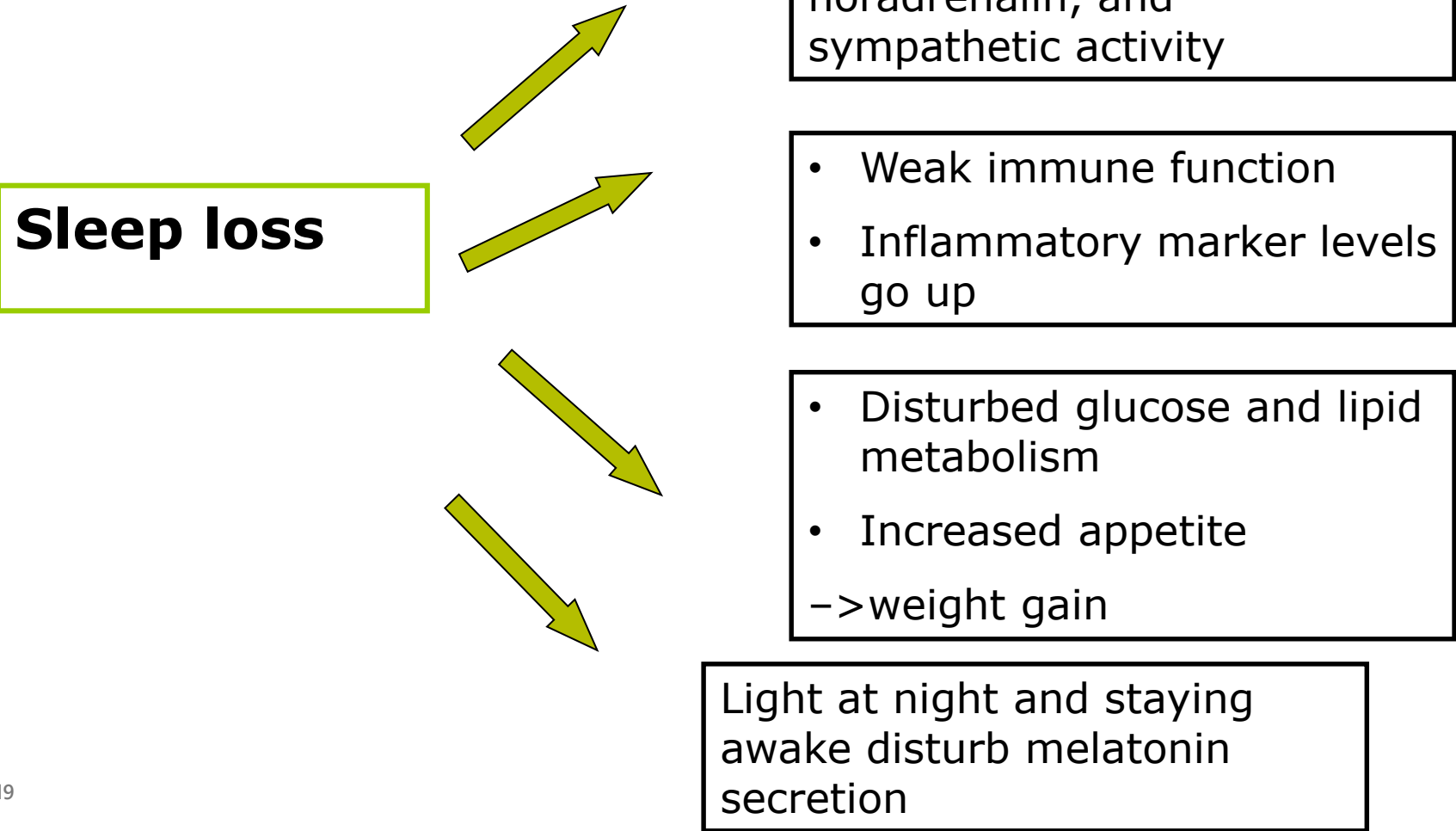


# Circadian bodily and brain functions



# Impaired sleep and mechanisms of poor health

**Sleep loss**



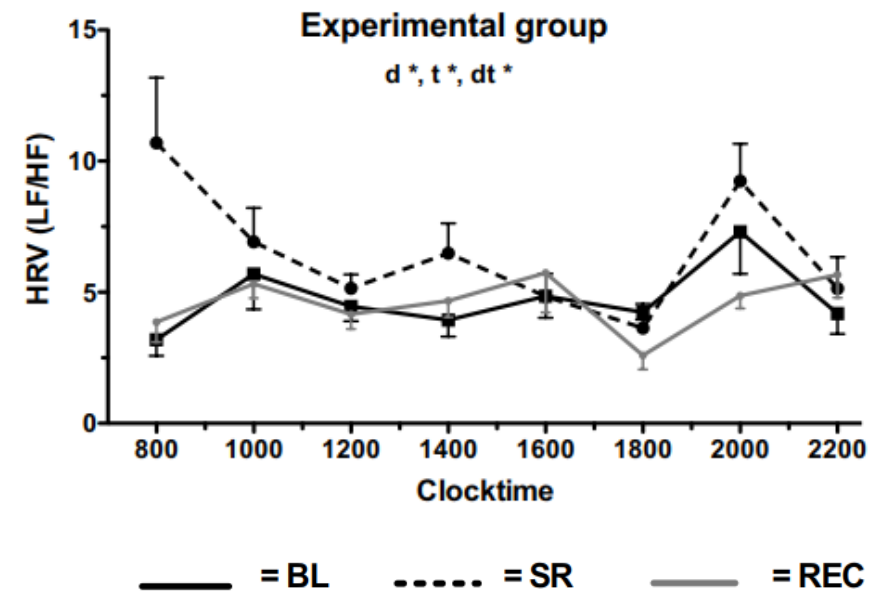
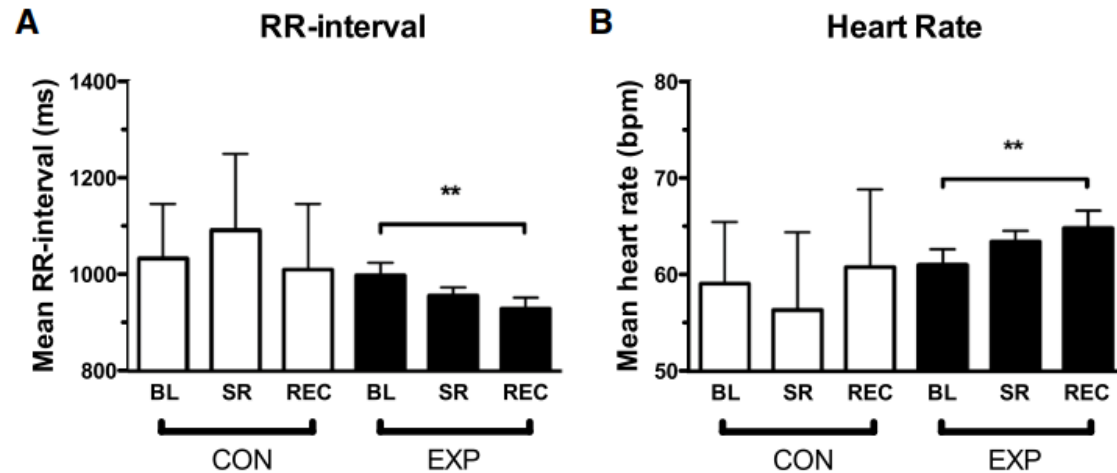
Secretion of cortisol,  
noradrenalin, and  
sympathetic activity

- Weak immune function
- Inflammatory marker levels go up

- Disturbed glucose and lipid metabolism
- Increased appetite  
->weight gain

Light at night and staying  
awake disturb melatonin  
secretion

# Sleep restriction and autonomic stress responses

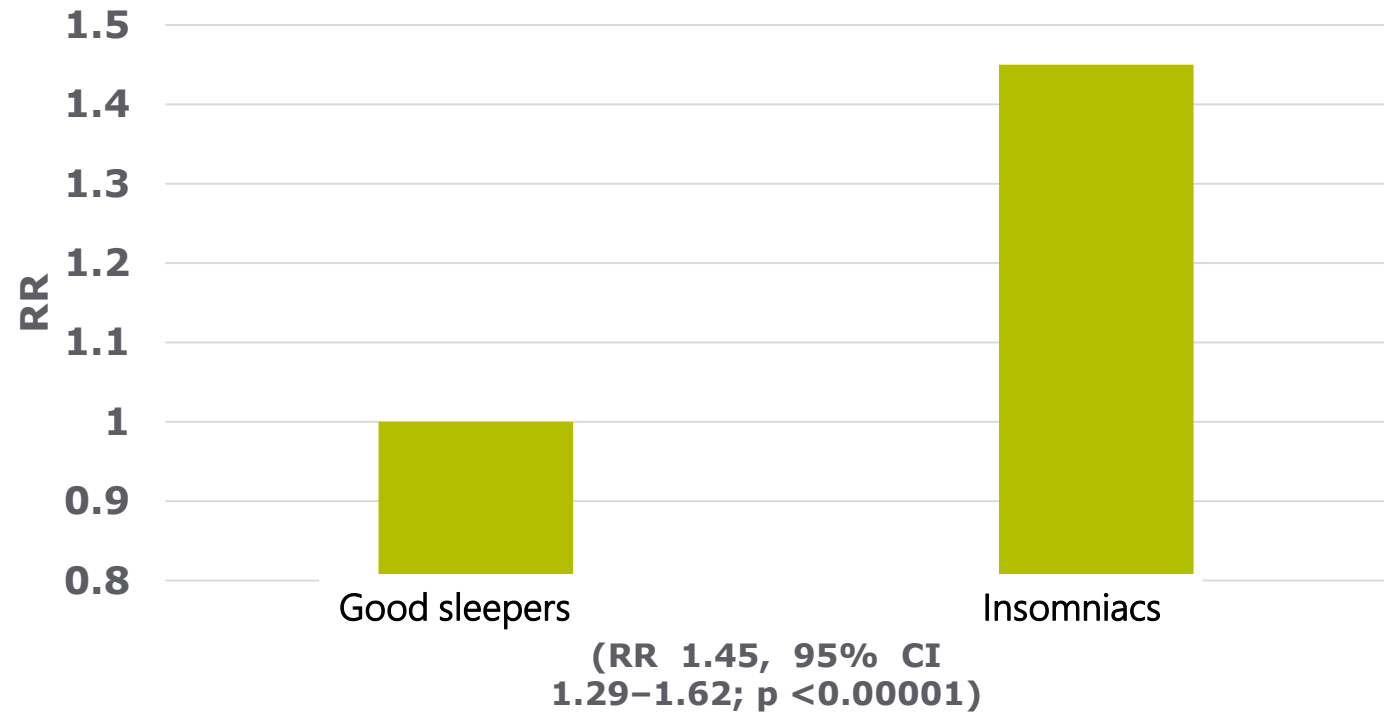


## Whole day heart rate variability

Physiological and autonomic stress responses after prolonged sleep restriction and subsequent recovery sleep in healthy young men

Sleep Biol. Rhythms (2018) 16:45–54  
DOI 10.1007/s41105-017-0122-x

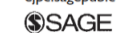
# Poor sleep quality is a health risk



## Insomnia and risk of cardiovascular disease: a meta-analysis

Francesco Sofi<sup>1,2,3</sup>, Francesca Cesari<sup>1</sup>, Alessandro Casini<sup>3</sup>,  
Claudio Macchi<sup>1</sup>, Rosanna Abbate<sup>2</sup> and Gian Franco Gensini<sup>1</sup>

European Journal of Preventive  
Cardiology  
2014, Vol 21(1) 57–64  
© The European Society of  
Cardiology 2012  
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sagepub.co.uk/journalsPermissions.nav  
DOI: 10.1177/2047487312460020  
ejpc.sagepub.com



# Work organisation level approach

## 1. Length of working hours

- length of daily, weekly and annual working hours

## 2. Time of the day

- early morning shifts
- morning shifts
- day shifts
- evening shifts
- night shifts

## 3. Shift intensity

- consecutive working shifts
- recovery time between shifts

## Working hour domains

## 4. Social aspects of working hours

- worktime control

- predictability of working hours

- irregularity of working hours

- distribution of free days

# Ergonomically improved shift schedules: an intervention study

Subjective ratings

	Intervention	
	F	p
Sleep length (h)	4.2	0.04
Sleep and alertness	9.8	0.003
Well-being at work	9.0	0.004
General health	5.6	0.02
Social life	1.8	ns
Family life	2.4	ns
Leisure time activities	6.4	0.01

HAKOLA *et al.*    Industrial Health 2010, **48**, 390–394



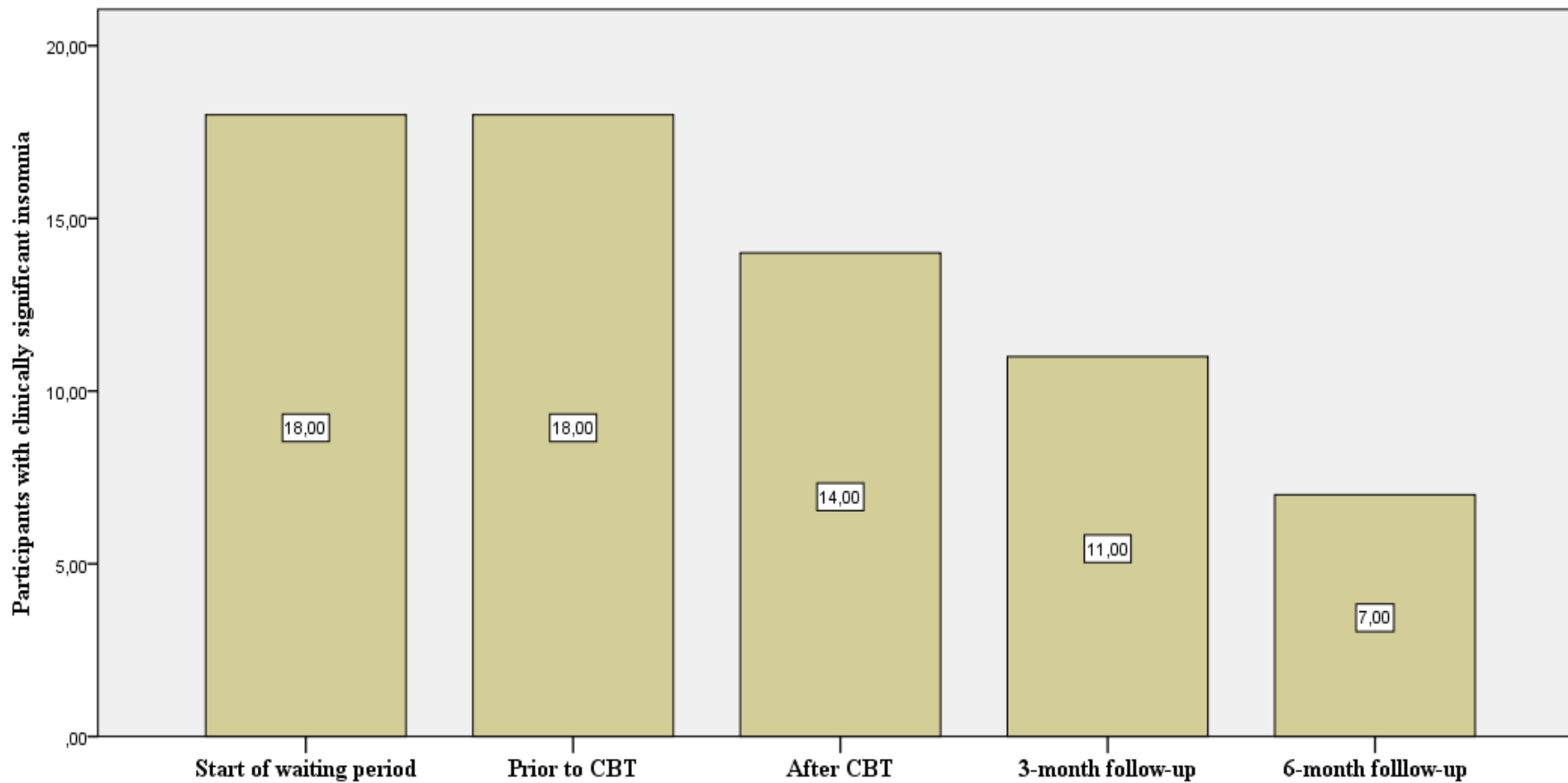
# Ergonomically improved shift schedules: an intervention study

HRV data

Parameter	Beginning of the shifts	
	Mean difference (95 % CI) <sup>c</sup>	<i>p</i> -value <sup>d</sup>
Mean RR (ms)	24.2 (−13.8, 62.3)	0.210
SDNN (ms)	0.4 (−2.1, 2.8)	0.761
RMSSD(ms)	1.3 (−0.9, 3.5)	0.250
LF power (ms <sup>2</sup> )	−11.4 (−98.3, 75.4)	0.795
LF power (n.u.) <sup>a</sup>	−4.8 (−9.2, −0.5)	0.030
HF power (ms <sup>2</sup> )	32.6 (−10.4, 75.7)	0.136
HF power (n.u.) <sup>b</sup>	4.8 (0.5, 9.2)	0.030
LF/HF	−2.0 (−3.8, −0.2)	0.032

*JÄRVELIN-PASANEN, et al:*  
*J Occup Health 2013; 55: 225–233*

# COGNITIVE BEHAVIOR THERAPY FOR INSOMNIA (CBT-I) AMONG SHIFT WORKERS



# Working hours, wellbeing and sleep in expert work

- Good sleep quality
- Good alertness at awakening
- Good recovery/detachment from work



Longer working hours the next day

Longer working hours



- Poorer sleep quality
- Lower alertness at awakening
- Poorer recovery/detachment from work

Article

**The Vicious Circle of Working Hours, Sleep, and Recovery in Expert Work**

*Int. J. Environ. Res. Public Health* **2018**, *15*, 1361; doi:10.3390/ijerph15071361

# Conclusions

- Work stress and working times are the two main risks to recovery and health
- To deal with the risks we need multiple approaches:
  1. Organisation-level actions
  2. Individual, employee-level prevention and interventions
  3. New solutions: personalized, interventions/feedback, e-health, technological solutions to identify, support and unobtrusive measures to follow the effects of actions



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# Thank you!



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