Workplace, technologies and health

A business-case for the healthy office building

Rianne Appel-Meulenkoek

Department of the Built Environment
Rianne Appel

Department of the Built environment, REMD group (Urban Science & Real Estate)

- Focus on user
- Corporate real estate and workplace management

**CREM processes**
- Strategic thinking
- Activities
- Management

**Environmental psychology**
- Effects on employee
Health in the work environment

OECD: 76% (very) good health
CBS: 88% adults happy (→ 58%)

CBS & TNO: 3,5mln days absence through stress
→ Nederlands Centrum voor Beroepsziekten:

**Work stress = occupational disease number 1 in NL!**

- 42% occupational diseases = psychological + 14% reports burnout symptoms
- Yearly costs of absence by burnouts **€1,8 billion**

Gallup: 9% employees is engaged: “the rest works, but without energy and passion”
Mental health

- burnout
- satisfaction
- concentration
- engagement
- well-being
- mood
- productivity
- sleep quality

→ obesity
→ heart- and cardiovascular
Physical work environment

Effects on health

- Direct (SBS, stress)
- Indirect → healthy behaviour!

Multiple dimensions

- Prevent stress + relief stress
- Design (light, temperature, etc.)
  + psychosocial dimensions (privacy, noise, etc.)
  + implementation process / use (flex or dedicated)

Centre for Disease Control (CDC)
Holy grail = productivity

Hard to measure in living lab

The most valuable asset of a 21st century institution will be its knowledge workers and their productivity

Peter Drucker (1909-2005)

Fig. 3. IEQ factors and Occupant Productivity. (Al Horr, et al, 2016)
Individual differences

Individual control!!

• Biggest dissatisfiers: Leesman®

  1. Temperature control
  2. Noise
  3. Quiet rooms
Smart physical work environment
Temperature

Conflicting studies on productivity effects
  • tasks + psychological factors (motivation)

Females higher temperature preferences than males

Leesman®

Temperature control important 77.6% (4th most important)
Satisfied 31% !!
  • Leesman+ 43%

↑1.0°C = ↓2% working performance (Seppänen et al., 2003)
↑ fatigue and level of mental effort (Tanabe et al., 2007)
Temperature

Smart Technology development

Ahrend comfort desk
Noise

Dissatisfaction with noise in all open plan types
Environmental stressor (Broadbent, 1971)

Leesman

- Noise important 72% (6th most important)
- Satisfied with:
  - Noise levels 31%
  - People walking past your workstation 30%
    - Leesman+ 45%, best building 72%

Dissatisfaction noise levels = strongest indicator perceived poor productivity

↑Stress, blood pressure, heart rate (Oseland & Hodsman, 2015)
Noise

Intelligible speech conversations
- near one’s desk
- in adjacent rooms
- at common facilities
- from telephone conversations

Unintelligible background conversations

Background Noise
- Music (radio)
- People passing-by, entering or leaving
- Noise from outside the office
- Sound of a particular colleague

Office equipment
- Telephones ringing
- Printers
- Fax
- Coffee machine

Installations
- Ventilation
- Air-conditioning

most annoying

performance complex tasks ↓7% if unattended speech highly intelligible, but NO effect low speech intelligibility (Hongisto et al, 2005)
Noise

Smart Technology development

The ABC's of acoustic design
- Absorb (i.e., Ceiling Tiles)
- Block (i.e., Cubicle Partitions)
- Cover (i.e., Sound Masking)

SoftDB
Quiet rooms

Concentration + privacy vs Desire more interaction + belonging/relatedness

Derails our ‘train of thoughts’ → creativity/innovation?

Once distracted, 10-25 minutes for same concentration level (Aron, 2016)

Leesman®

‘Quiet rooms for working alone or in pairs’ important 60,8% (11th most important)
Satisfied 30% !!
• Leesman+ 53%

Workplace, technologies and health
Quiet rooms

Participatory design/implementation (speech policies)

Behaviour change vs coping
• 76% same desk every day
• 4% switches during the day
• ↑ working from home
• Not adjusting desks/chairs

→ Stress due to lack of person-environment fit
Business case

Hard and soft evidence

Costs versus benefits →
From cost reduction to cost optimisation

2019-2021 Postdoc TU/e
• Complexity mental health+
• Tests technologies
• Excel tool

Facilitaire-info.nl

Business case

Costs

- personnel
- building use
- workplace
Challenges for workplace research

• Evidence based design
  o Increase awareness
  o How to deal with personal differences
• More meta analyses (many case-studies)
  o Different definitions office types and employee outcomes
  o Generally accepted + tested scales
• More holistic models
  o Gender, age, job character, personality, social work environment, etc.
• Space
  o How to measure it?
  o Use of building sensors

One size fits no-one
Questions?

Rianne Appel-Meulenbroek
h.a.j.a.appel@tue.nl
+31(0)40-2472092
www.tue.nl/staff/h.a.j.a.appel

https://nl.linkedin.com/in/rianneappel
@R_Appel_Meul

http://www.twrnetwork.org/

“The only way to provide real evidence for the business case of workplace interventions is by getting involved in transdisciplinary research initiatives.”