



**InnoRenew CoE**

Livade 6, 6310 Izola/Isola, Slovenia, T: +386 40 282 944, E: [coe@innorenew.eu](mailto:coe@innorenew.eu), [www.innorenew.eu](http://www.innorenew.eu)

# Psychological well-being in buildings

Dean Lipovac

**TIMBER - A HEALTHY FUTURE  
FOR SUSTAINABLE BUILDINGS**

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# Issues with mental health - a socioeconomic problem

- 18% of US adults have a mental illness
- Adults with a serious mental illness (4%) have a shorter life expectancy
- 30-45% of all disability benefit claims linked to mental health
- Large medical costs
- Many are not receiving treatment



Sources: [1](#), [2](#)

# The role of emotions in mental health

- The ratio between pleasant and unpleasant emotions is **crucial for well-being**
- This ratio provides:
  - valuable information about mental health
  - target for interventions



# Why is it good to feel good?

- Frequent pleasant emotions increase:
  - Social resources (solidifying bonds, making new bonds)
  - Psychological resources (developing resilience)
  - Physical resources (more exercise)
  - Intellectual resources (learning)
- ... and lead to:
  - Many successful outcomes (e.g., job success)
- The opposite is true for unpleasant emotions (including chronic stress issues)
- We should aim to **increase the frequency of pleasant emotions** and **decrease the frequency of unpleasant emotions**



# The main outcome of successful interventions

- Every mental health intervention (including *all* types of psychotherapy, antidepressants, etc.) should improve the ratio of pleasant to unpleasant emotions
- What is common to the most successful interventions?





# General mental health interventions

- Healthy eating (nutrient deficiencies, gut bacteria)
- Exercise (especially aerobic)
- Good sleep hygiene (dark, no screen, temperature)
- Cognitive behavioural therapy (e.g., reframing)
- Mindfulness (meditation) (“here and now”)
- Positive psychology interventions (e.g., three positive things)

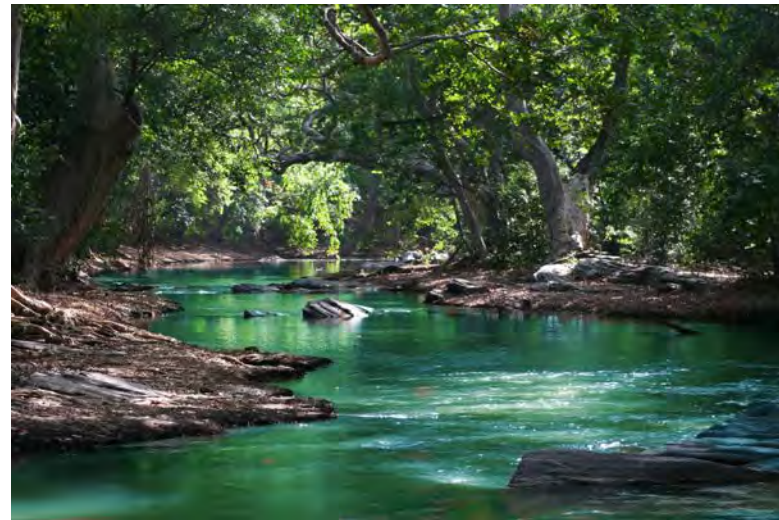


# How can the built environment help?

- Restorative environments (REED)
  - Environments that help restore depleted resources (physiological, psychological)
  - Encouraging healthy behaviours

# Interventions in the built environment – the basics

- Environment of evolutionary adaptation as a basic guideline:
  - Light (SAD)
  - Air quality (pollutants)
  - Temperature
  - Noise reduction
  - Nature (plants, photos, natural materials)
  - Exercise (stairs, active office)





# Interventions in the built environment – encouraging social interactions

- Rooms for social activities (e.g., lounges)
- Activity generators (e.g., coffee in the kitchen)
- Furniture arrangements





# Interventions in the built environment – enabling personal control

- Access to privacy
- Control of temperature, lighting ...
- Choice of decoration



# How else can we influence emotions/behaviour in the built environment?

- Examples from other fields:
  - Watching-eye effect leads to higher donations for coffee
  - Hand washing increases with the scent of citrus
  - Scent of an all-purpose cleaner increases cleaning behaviours
  - Switching music from German to French affects consumer choice of wine



# Which other interventions are feasible?

- Can we ...
  - increase consumption of water? (water coolers)
  - improve eating habits? (fresh fruit)
  - encourage mindfulness/relaxation? (quiet rooms)
  - promote cognitive reframing techniques? (posters with quotes)
  - integrate positive psychology interventions? (post-it notes)
  - utilize other human characteristics? (e.g., smile to turn on the lights, mood notifications)



# How to assess well-being in buildings?

- Challenges
  - We tend to be good at detecting how we feel, but not why we feel the way we do
  - Issues with both the narrow focus (e.g., experiments) and the broad focus (e.g., naturalistic observation)



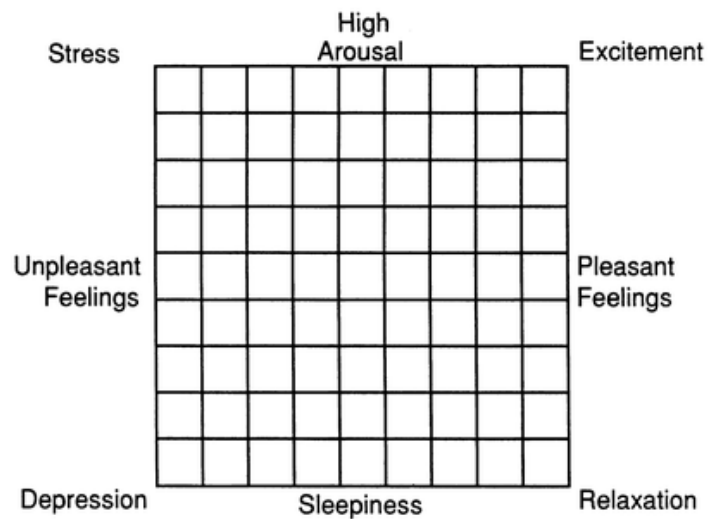
# General approach to assess well-being in buildings

- The most important question: Does this building feature/intervention make users feel good or bad?
- Inspect many factors:
  - Mood, sleep, psychosomatic symptoms (questionnaires)
  - Psychophysiology
  - Cognitive performance



# Examples – Emotions

## Affect grid



## PANAS

	1	2	3	4	5
	Very Slightly or Not at all	A Little	Moderately	Quite a Bit	Extremely
_____ 1. Interested					
_____ 2. Distressed					
_____ 3. Excited					
_____ 4. Upset					
_____ 5. Strong					
_____ 6. Guilty					
_____ 7. Scared					
_____ 8. Hostile					
_____ 9. Enthusiastic					
_____ 10. Proud					
_____ 11. Irritable					
_____ 12. Alert					
_____ 13. Ashamed					
_____ 14. Inspired					
_____ 15. Nervous					
_____ 16. Determined					
_____ 17. Attentive					
_____ 18. Jittery					
_____ 19. Active					
_____ 20. Afraid					

## DASS

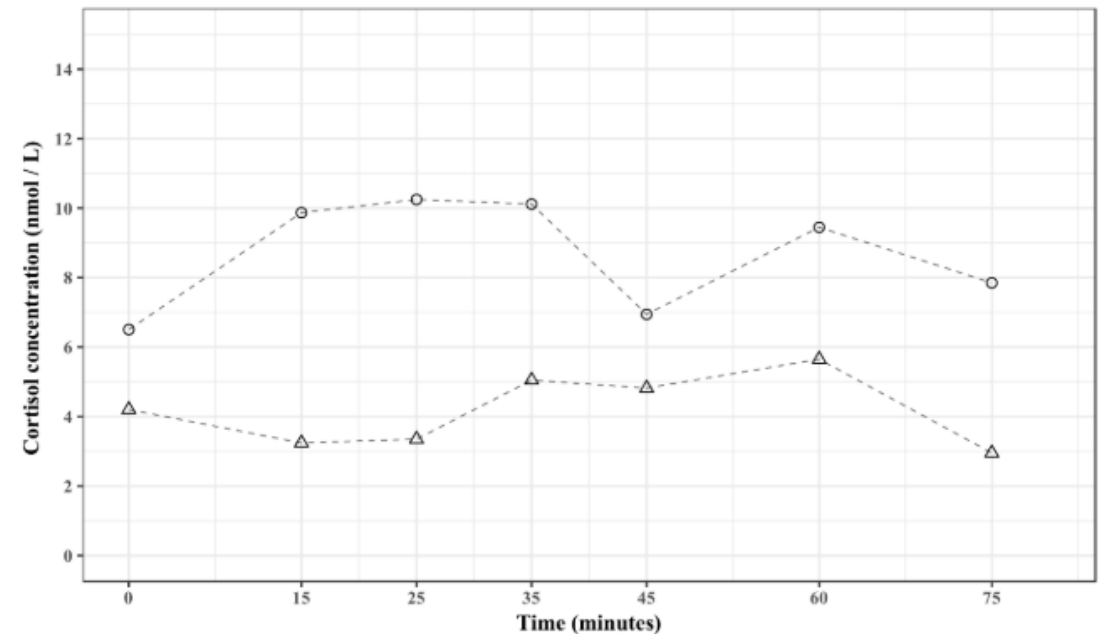
The rating scale is as follows:

- 0 Did not apply to me at all
- 1 Applied to me to some degree, or some of the time
- 2 Applied to me to a considerable degree, or a good part of time
- 3 Applied to me very much, or most of the time

1	I found it hard to wind down
2	I was aware of dryness of my mouth
3	I couldn't seem to experience any positive feeling at all
4	I experienced breathing difficulty (e.g., excessively rapid breathing, breathlessness in the absence of physical exertion)
5	I found it difficult to work up the initiative to do things

# Examples – Psychophysiology

- Heart rate
- Blood pressure
- Electrodermal activity
- Cortisol levels
- Brain electrical activity (EEG)
- Muscle activity (EMG)
- Pupil diameter (EGG)



Test ○ Control △ Wood

[Source](#)

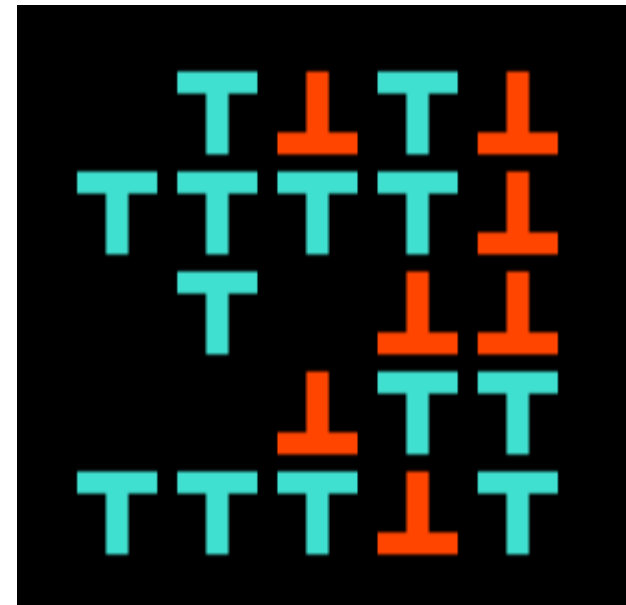


# Examples – Cognitive Performance

## Stroop Task

PURPLE YELLOW RED  
BLACK RED GREEN  
RED YELLOW ORANGE  
BLUE PURPLE BLACK  
RED GREEN ORANGE

## Visual Search





# Summary

- Emotions are central
- Interventions should address:
  - basics (light, air, nature, exercise)
  - social aspects (furniture placement, lounges)
  - personal aspects (personal control)
- Measuring well-being in buildings
  - Questionnaires, psychophysiology, cognitive performance



# Conclusions

- Issues in mental health present a large problem
- The built environment could support mental health (with (cost)effective interventions)
- Even small changes can make a difference



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# Thank you for your time.



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