

The role of biodiversity in stress alleviation: an experiment using VR

1. Introduction

Exposure to natural environments has been shown to have an alleviating effect on stress in humans. But is this effect equal when viewing different types of natural environments? **Is a natural forest with higher biodiversity better at alleviating stress than a low biodiversity spruce plantation, or an urban city?**

2. Method

Three virtual environments were created with images from a 360 camera paired with audio recordings: an **urban city**, a **spruce plantation**, and a **natural forest**. The environments were simulated using virtual reality. 31 healthy participants were randomly divided into three test groups, one for each environment. One person was tested at a time, and the participants were not allowed to know which of the environments they had been randomly selected to.

An electrocardiogram and galvanic skin response were recorded throughout the entire experiment to record stress levels.



Physiological measurements

- Skin conductance level
- Heart rate variability
- Heart rate

VR Environments



Urban city (very low biodiversity)



Spruce plantation (low biodiversity)



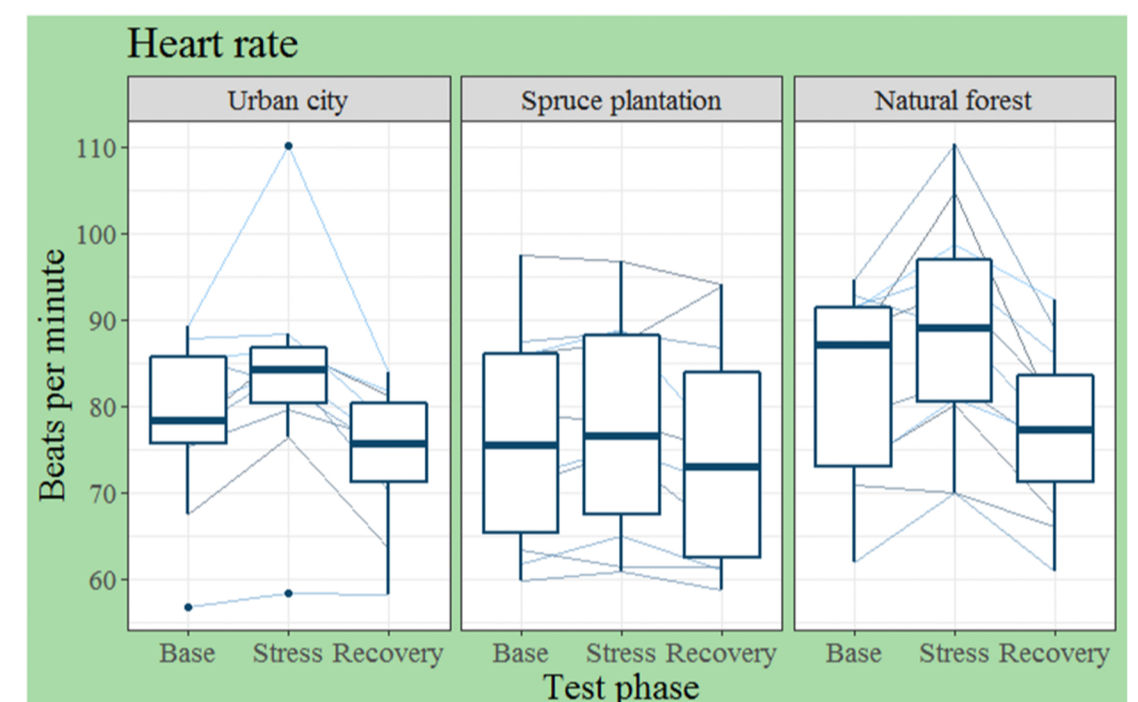
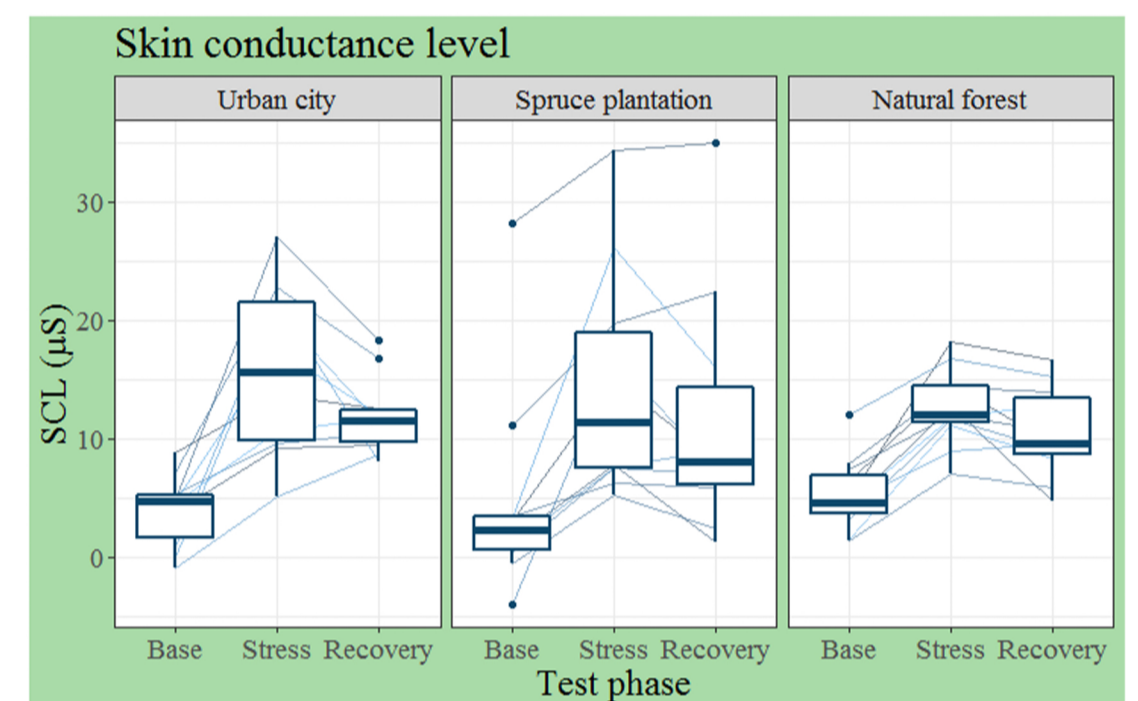
Natural forest (high biodiversity)

Experimental protocol

- 1 Baseline recording**
(1min) normal state levels
- 2 Stress phase**
(5min) stress was induced using mild electric shocks and loud noises
- 3 Recovery phase**
(5min) participant viewed one of the environments in the VR headset and recovered from the stress phase

3. Results

The number of participants in each test group: urban city = 10, spruce plantation = 10, natural forest = 11.



Physiological measurements of skin conductance (top) and heart rate (bottom) during the course of the experiment for all participants.

Skin conductance levels increased from the baseline levels to the stress phase. All participants were in an elevated state of stress prior to the recovery phase.

Combining the effects from the skin conductance and the heart rate measurements it was evident that the natural forest had the most alleviating effect out of all three environments. The spruce plantation and urban city groups had both an alleviating effect, but it was not statistically significant.

4. Conclusions

The stress alleviation effect is not equal when viewing different natural environments. Recovery in the spruce plantation or urban city did not activate an equally strong response from the para-

sympathetic nervous system as the natural forest when the body recovered from stress.

Biodiversity in forests may have an important role for stress alleviation as an ecosystem service and for the future of human health and well-being.



Scan here to learn more about the study