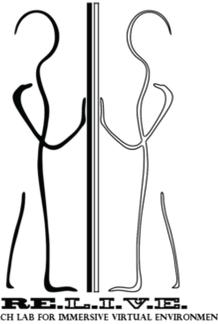




# Exploring the Restorative Properties of Urban and Nature Settings Using Virtual Reality

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## Background

Research has found that exposure to nature (real, artificial, or virtual) can have cognitive and physiological benefits. Some of these benefits include reductions in physiological stress and improvement of emotional state (Valtchanov, Barton & Ellard, 2010).

However, studies have been unable to speak clearly about the effects of being immersed in nature and urban environments due to the many potential confounds present in real-world experiments investigating the matter. Furthermore, by comparing nature settings only with urban settings, the research on the restorative properties of nature has failed to address the ambiguity of whether nature settings are truly restorative and urban settings neutral, or whether nature settings are neutral and urban settings stressful (Valtchanov et al., 2010).

The objective of the current study was to address this ambiguity and potential confounds in the research by introducing a neutral comparison and using immersive virtual reality to control for confounding factors.

## Method

=> 69 undergraduates from the University of Waterloo.  
=> Head-mounted-display with 60-degree field-of-view and head-tracking.

=> Procedure:

- 1.) Baseline measure of emotional state and stress using questionnaires, skin conductance level, and heart-rate.
- 2.) 10 minutes of stress-induction using a variant of the Markus & Peters Arithmetic Test to establish consistent stress levels among all participants.
- 3.) Post-stress measures of emotional state and stress.
- 4.) Randomly assigned to explore one of the three virtual environments for 10 minutes.
- 5.) Post-VR measures of emotional state and stress.

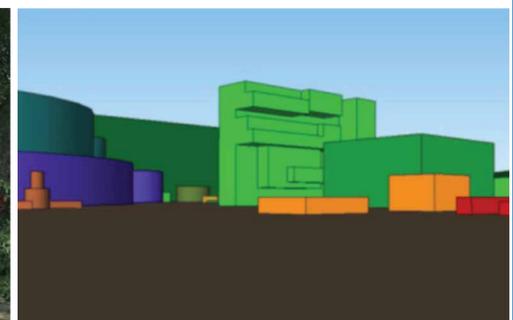
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This research was supported by SSHRC and NSERC grants awarded to Colin Ellard.

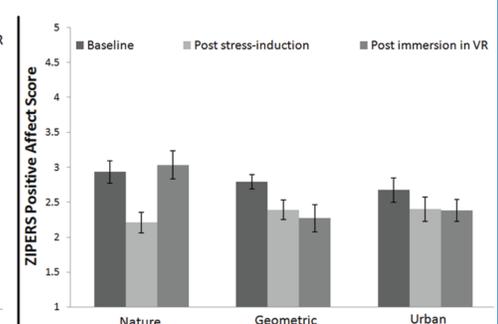
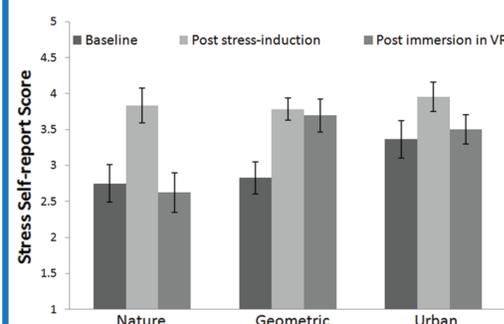


## Virtual Environments



## Results

- => As predicted, those who explored the virtual nature environment had the greatest reduction in stress.
- => Those who explored the virtual nature setting had the greatest improvement in emotional state.
- => The geometric and urban environments had no significant effect on stress or emotional state.



## Conclusions

- => Nature is restorative and urban (built) environments are neutral in the absence of stressful stimuli (e.g., cars.)
- => Urban environments may be improved by adding nature.
- => Virtual reality can be used to test the effects of an architectural design on stress and emotional state.
- => Architectural designs incorporating organic shapes instead of rigid geometry may promote better mental health.

## References:

Valtchanov, D., Barton, KR., Ellard, C., Cyberpsychology, Behavior, and Social Networking. Available online ahead of print. doi:10.1089/cyber.2009.0308

