



KEY POINT SUMMARY

OBJECTIVES

Patients' heart rates were measured in a university office to determine under which of the following conditions they experienced the best physiological and psychological benefits:

- (1) looking out a glass window with a nature scene,
- (2) looking at an HDTV-quality real-time view of nature through a plasma display "window",
- and (3) looking at a blank wall.

A Plasma Display Window? – The Shifting Baseline Problem in a Technologically Mediated Natural World

Kahn Jr. P., Friedman, B., Gill B., Hagman J., Severson, R. L., Freier, N. G., Feldman, E. N., Carrere, S., Stolyar, A.

2009 | *Journal of Environmental Psychology*
Volume 28, Pages 192-199

Key Concepts/Context

The general purpose of this study is to test the physical and psychological effects of experiencing nature through a technology medium. Past research has shown that contact with nature can lead to "enjoyment, satisfaction, and increased levels of satisfaction with one's home, one's job, and with life in general" (Kaplan & Kaplan, 1989, p. 173). So in an fast-changing world of technology-mediated healthcare, the question posed in this study revolves around whether simulated nature scenes can elicit the same health benefits that real nature has shown to produce.

The study investigates the physiological effects on 90 participants exposed to one of three settings: (1) a glass window with a natural scene, (2) a plasma window with a real-time HDTV view of the same scene, or (3) a blank wall. The physiological effects measured were in terms of heart rate recovery from low-level stress. The physiological effect measured was the speed of heart rate recovery.

The researchers proposed two hypotheses and two open questions. The two hypotheses were: (1) The heart rate recovery from the nature scene would be better than staring at a blank wall, and (2) If participants spend more time looking at a glass window, their heart rate will decrease more quickly. The two open questions were: (1) How will the heart rate recovery when starting at the plasma window compare to staring at a blank wall? and (2) How will the speed of heart rate recovery compare when participants spend more time looking at a plasma window compared to a glass window with a natural scene?



DESIGN IMPLICATIONS

As technology continues to become a more prominent part of the healthcare delivery system, it does not replace the physiological and psychological benefits that nature can have on stress recovery.

Methods

The study consisted of 90 undergraduate summer-school students aged 18-34, separated into three groups of 30 people each. Each group was exposed to one of three conditions in the same university office: a glass window, an HDTV plasma “window,” or a blank wall seated in a chair from a fixed distance. The data collection took place from July through September, with the first five-week set of participants assigned to either the plasma window condition (30 participants) or the blank wall condition (15 participants). Participants during the remaining five weeks of data collection were assigned to the glass window condition (30 participants) or the blank wall condition (15 participants).

Participants started with a five-minute “waiting period” in the office, followed by a series of four tasks: a 10-minute proofreading task, a three-minute “name a Doodle” task, a seven-minute “invest a Doodle” task, and a 10-minute “tin can unusual uses” task. The purpose of the four different distraction tasks was to engage the participant in various forms of mental engagement before making the participant go through another five-minute “waiting period.” Before each of these six sessions, a researcher gave the participant instructions for the new activity, which elevated their heart rate and served as a low-level stressor. Monitoring changes in heart rate helped serve as a marker for how much each “window” condition helped (or didn’t help) to alleviate the participants’ physiological or psychological stress.

Electrocardiogram (ECG) waveform data was collected using a Biopac MP 100. The cardiac interbeat interval (IBI) was determined from the ECG waveform based on the R-wave intervals, and the heart rate was computed as a reciprocal of the IBI.

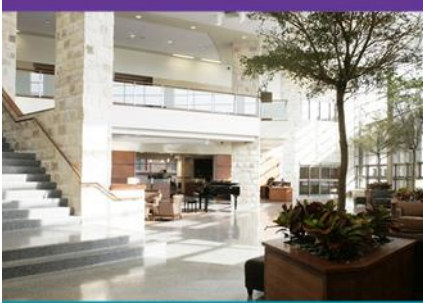
To document the participants’ looking behavior, their faces were recorded using a camera time-synchronized with the physiological recording equipment. A second-by-second coding of facial expressions was recorded to analyze frequency and duration of how long the participant looked at the glass window, plasma window, or blank wall.

The image on the plasma screen was a live recording of the same nature scene observed through the glass window. To account for changing weather conditions, cloud cover conditions were recorded at the beginning and end of each session, to be collapsed as a single evaluation of the general weather conditions during the session. This helped to account for any variability in weather or lighting between conditions.

Findings

Heart rate recovery from low-level stress was better from glass window than blank wall.

There was no significant benefit from looking at a nature scene on an HDTV plasma “window” vs. a blank wall.



The Center for Health Design: Moving Healthcare Forward

The Center for Health Design advances best practices and empowers healthcare leaders with quality research providing the value of design in improving patient and performance outcomes in healthcare facility planning, design, and construction, optimizing the healthcare experience and contributing to superior patient, staff, and performance outcomes.

Learn more at
www.healthdesign.org

Participants were as likely to look at the glass window as they were to look at the HDTV plasma “window.”

The amount of time participants looked at the glass window was significantly longer than looking at the HDTV plasma “window.”

The more time participants looked at the glass window, the more quickly their heart rate would decrease.

There was no significant relationship found between how long participants looked at the plasma “window” and how quickly their heart rate decreased.

Variability in weather conditions in the glass window and HDTV plasma “window” scenes showed no significant impact on the results.

Variability in the amount of light from the glass window condition had no significant effect on heart rate recovery speed.

Limitations

Because installing and uninstalling the plasma window requires a lot of effort, it was not possible to switch data collection efforts between glass window and plasma window conditions. Therefore, all glass window conditions were run consecutively and all plasma window conditions were run consecutively, so it was not possible to randomly assign participants to one of three conditions.

Previous research states that daylight accrues physiological and psychological benefits. The glass window was the only condition that afforded natural sunlight into the room. Part of the observed difference in heart rate recovery between the blank wall condition and the glass-window condition may be due to natural daylight vs. artificial light, as opposed to nature vs. simulated nature scenes.

Difference in glass window vs. HDTV plasma “window” results may be due to lack of full fidelity in the digitized real-time display; i.e., plasma windows do not afford parallax (the apparent shifting of objects when viewed at different angles), pixilation, 2-D vs. 3-D).