

# Environmental Settings & Health Effects (ESHE) Study: Holistic Measures of Health

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## Introduction

Environmental settings have the ability to influence physiological and psychological processes that affect health and well-being. A small but growing body of research supports different complementary theories regarding the ability of environmental settings to influence objective (e.g. cortisol) and subjective (e.g. mood, attention) measures of health. Many theories incorporate the evolutionarily-based concept of “biophilia”, a concept of adaptive response to naturally occurring stimuli.

Given that modern urbanization processes are increasingly exposing individuals to human built environments, while simultaneously limiting access to natural green environments, it is useful to understand what effects these exposures are having on individual health.

This study investigates the effect that short-term exposures to natural and built environments have on objective and subjective measures of health and well-being.

## Objectives

### Primary Aim

To assess differences in physiological measures of stress (i.e. salivary Cortisol and IgA) between 1) Natural, 2) Urban, and 3) Indoor 20-minute environmental exposures.

### Secondary Aim

To assess differences in mood, subjective vitality, and short-term memory and attention between 1) Natural, 2) Urban, and 3) Indoor 20-minute environmental exposures.

### Tertiary Aims

a. To investigate the influence of Environmental Identity, Perceived Stress, Perceived Restorativeness, and Environmental Aesthetics as mediating factors on primary and secondary outcome measures.

b. To evaluate differences in Chromogranin A, an exploratory measure of stress, between 1) Natural, 2) Urban, and 3) Indoor 20-minute environmental exposures.

## Study Design

This pilot study is a randomized, 3-arm cross-over trial. Participants attend three 3-hour visits occurring 1-2 weeks apart. During each visit participants are exposed for 20 minutes to one of three different environmental settings:

a) Forested Natural Area, b) Built Urban Plaza, c) Windowless Indoor Room (See Figure 1).

## Recruitment Criteria

Participants (N=30) are recruited from the student populations of NCNM & Lewis & Clark College.

• **Inclusion:** Age 18-50 years old; Good general physical & mental health status; Able to travel in passenger van for ~15 minutes; Able to remain seated for 30 minutes without discomfort in outdoor public place; Able to refrain from alcohol, tobacco or recreational drug use for  $\geq 24$  hours; Attend all three study visits

• **Exclusion:** Current diagnosis or history of significant chronic disease, including endocrine disorder, salivary disorder, auto-immune condition, current chronic or acute pain, mental health condition (including specific phobias e.g. agoraphobia), visual or auditory sensory impairment.

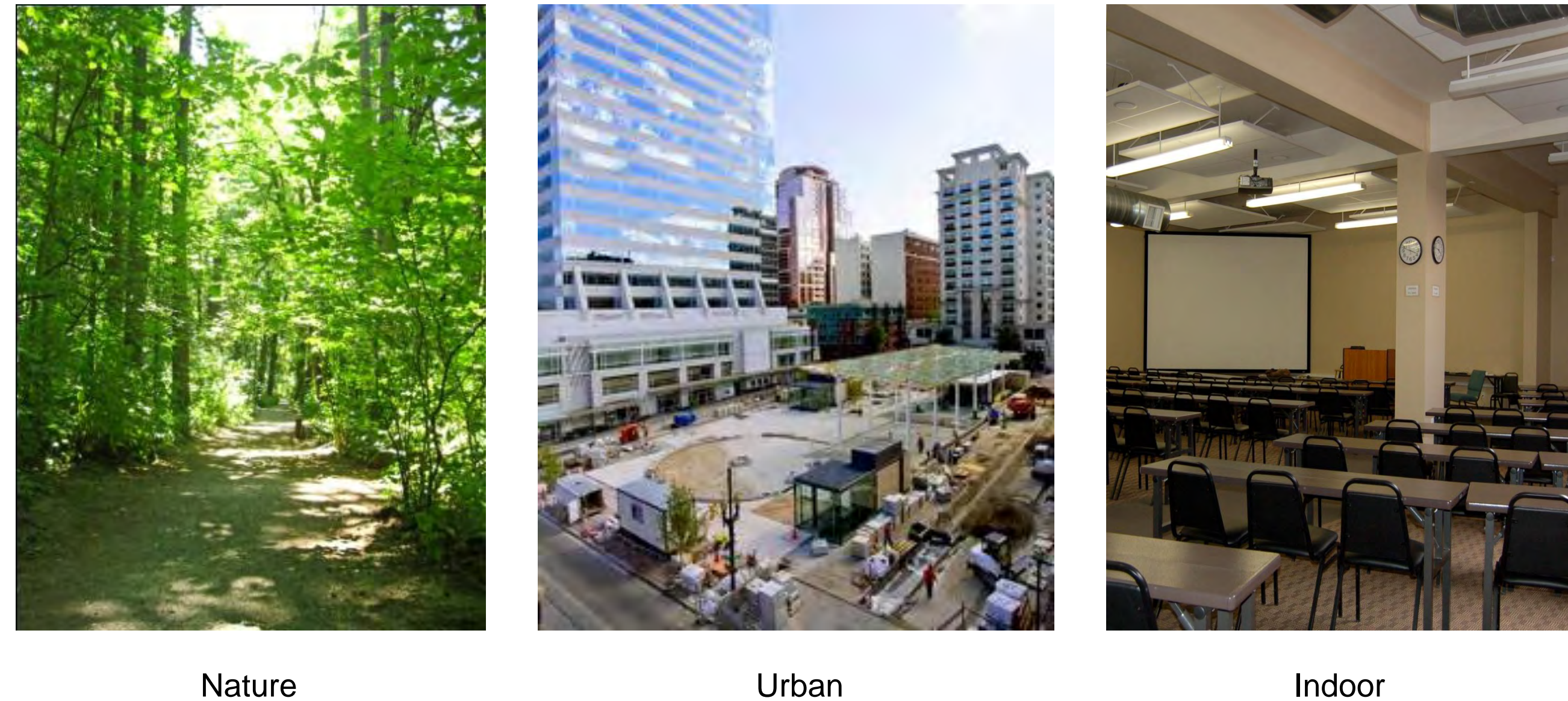


Figure 1: Participants are exposed for 20 minutes to a) Natural, b) Urban and c) Indoor environmental settings.

## Methods

For each of three study visits, all participants meet as a group at the initial study location and are individually assessed for baseline physiological and psychological status. Participants are then separated into randomized sub-groups and transported to one of three environmental settings.

After sitting quietly for 20 minutes, repeat measurements of physiological and psychological status are taken. Individual assessment of the environmental setting using quantitative and qualitative methods is also performed. Due to the cross-over design, all participants will experience each of the three environmental settings during this study.

A mixed-methods approach to data collection is used. Objective measurements of physiological stress status (i.e. salivary Cortisol, Immunoglobulin A & Chromogranin A; See Figure 2a) as well as subjective quantitative measures of affective (i.e. Profile of Mood States (POMS), Subjective Vitality Scale (SVS); (Figure 2b)) and cognitive-attentional (i.e. Digit Span Backwards (DSB)) status are taken. Subjective qualitative data is also collected on-site via individual written- and audio-recorded group responses (Figure 2c).

Potential co-variables include individual responses to the following pre- or post-visit surveys: Environmental Identity (EID), Participation In Nature (PIN), Pre-existing Stress (PSS), Perceived Restorativeness (PRS) and Environmental Aesthetic Appreciation (EAAS) scales. Ambient environmental data (i.e. Light, Noise, Temperature, Humidity) collected at each location are also considered as potential co-variables.

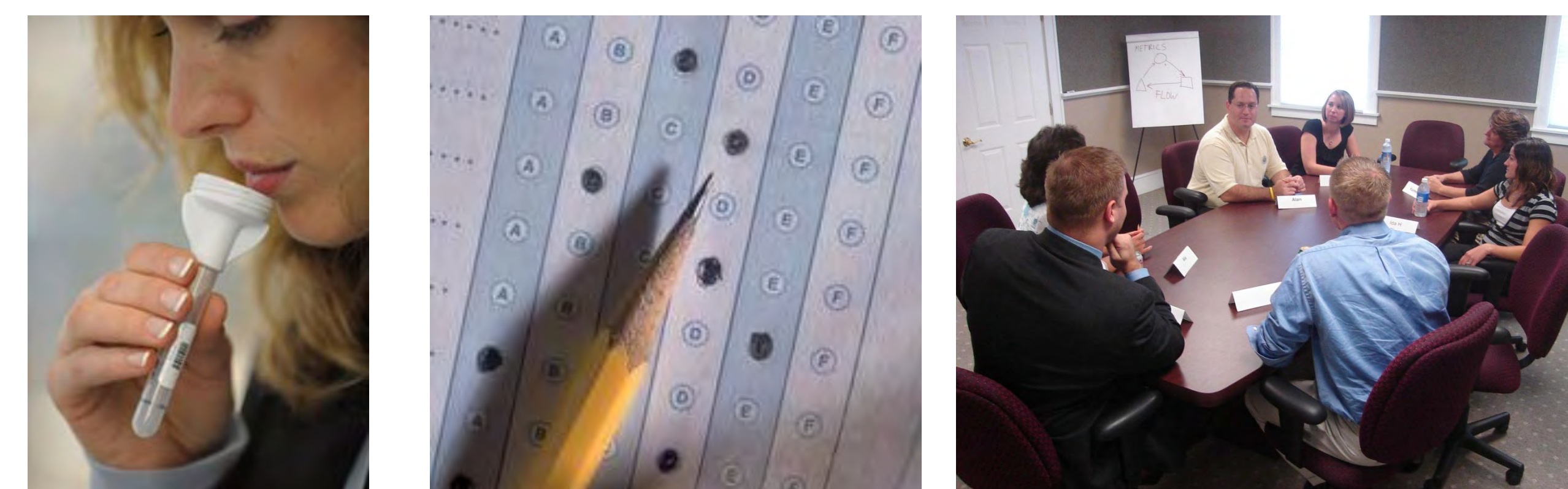


Figure 2: Data is collected via a) Objective and b) Subjective Quantitative and c) Qualitative methods.

## Results

The ESHE Study is currently being conducted. However, it is hypothesized that:

- Exposure to a Nature environmental setting will produce decreased values of salivary Cortisol and IgA relative to the Urban and Indoor setting exposures.
- Exposure to a Nature environmental setting will produce improved mood, subjective vitality, and short term-memory and attention relative to the Urban and Indoor setting exposures.
- Amount of positive change on various co-variate scales (lower for Perceived Stress) will be related to greater reduction in salivary cortisol.
- Exposure to a Nature environmental setting will produce decreased values of Chromogranin A relative to the Urban and Indoor setting exposures.

## Significance

This study will demonstrate how natural & built environments affect psycho-physiological responses in individuals, and how these responses are influenced by internal and external mediating factors. This information can be used in multiple ways:

1. Contribute to the body of research that suggests exposure to different settings can be utilized to influence health status.

1. If hypotheses are correct, this information will support the growing movement toward inclusion of natural “green” spaces as settings for emerging health practices such as eco-therapy and green exercise. The implications of study findings are applicable to a wide variety of health-related areas. For example:

- As a preventive stress-reduction for general populations.
- Restoration of cognitive attention for populations with decreased attentional capacity.
- Therapeutic setting for mental/emotional conditions (e.g. depression, anxiety, PTSD).

3. Support the current movement of contemporary health paradigms away from the predominant reductionistic biomedical model of pathocentric pharmacological interventions, and toward a holistic approach of health promotion that includes a more ecological model to health determination.

4. Identification of areas of consideration for public health officials, urban planners, landscape architects and land-use policy makers, particularly in rapidly urbanizing areas where access to natural environments are limited and/or decreasing.

## References

- Clayton S: **Environmental Identity: A conceptual and an operational definition.** In: *Identity and the Natural Environment*, edn. Edited by Clayton S, Opatow S. Cambridge, MA: MIT Press; 2003: 45-65.
- Hartig T, Evans G, Jamner L, Davis D, Gärling T: **Tracking restoration in natural and urban field settings.** In: *J Env Psychol*. vol. 23; 2003: 109-123.
- Hartig T, Korpela KM, Evans G, Garling T: **A Measure of Restorative Quality in Environments (Perceived Restorativeness Scale).** In: *Scandinavian Housing and Planning Research*. vol. 14; 1997: 175-194.
- Kuo F, Faber Taylor A: **A potential natural treatment for attention-deficit/hyperactivity disorder: evidence from a national study.** In: *Am J Pub Health*. vol. 94; 2004: 1580-1586.
- Lee J, Park B-J, Tsunetsugu Y, Ohira T, Kagawa T, Miyazaki Y: **Effect of forest bathing on physiological and psychological responses in young Japanese male subjects.** In: *Public Health*. vol. 125; 2011: 93-100
- Miyakawa M, Matsui T, Kishikawa H, Murayama R, Uchiyama I, Itoh T, Yoshida T: **Salivary chromogranin A as a measure of stress response to noise.** In: *Noise and Health*. vol. 8; 2006: 108.
- Ryan RM, Weinstein N, Bernstein J, Brown KW, Mistretta L, Gagne M: **Vitalizing effects of being outdoors and in nature.** In: *J Env Psychol*. vol. 30; 2010: 159-168.
- Tenngart Ivarsson C, Hagerhall C: **The perceived restorativeness of gardens-Assessing the restorativeness of a mixed built and natural scene type.** In: *Urban Forestry & Urban Greening*. vol. 7; 2008: 107-118.
- Ulrich R, Simons R, Losito B, Fiorito E, Miles M, Zelson M: **Stress recovery during exposure to natural and urban environments.** In: *J Env Psychol*. vol. 11; 1991: 201-230.
- Wilson E: **Biophilia.** Cambridge, MA: Harvard University Press; 1984.

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