

Adolescent Responses to Varying Environments in Virtual Reality Simulations

NCT04465240

April 4, 2024

Statistical Analysis Plan

STATISTICAL ANALYSIS PLAN

Prior to analyses we will (a) conduct pre-processing for psychophysiological data, and (b) screen data for quality and integrity, including evidence of significant outliers, variable distributions, and checks for violations of analysis assumptions. Variables will be transformed as needed. We will also conduct a factor analysis to determine if discrete emotion measures can be reduced. We will then test the effectiveness of randomization to virtual neighborhood condition, using *t* tests and chi-square tests, examining group/condition differences in demographics and all potential covariates. Subsequent statistical models will adjust for variables found to differ between experimental groups ($p < .05$).

Analysis will focus on the main effects of the virtual neighborhood condition – neighborhood disadvantage and neighborhood advantage/affluence – on emotional, psychophysiological and neuroendocrine outcomes within the single study session. For measures available at one time point during the study session, after the experiment (e.g. all emotional measures), multiple linear regression models will be used to estimate the mean difference in outcome between groups after controlling for covariates as needed. For outcomes measured repeatedly over the course of the single study session (e.g. cortisol, psychophysiological measures), linear mixed-effect modeling with random effects will be used to account for the lack of independence among repeated measures (level-1) nested within individuals (level-2). With repeated measures we are able to test whether the outcome of interests differs between groups over the course of the single study session, and whether the rate of change or the level at specific important study epochs (e.g. during/after the virtual neighborhood condition) differs between groups. Cortisol is measured at five specific time points during the study session (at the end of baseline, after the virtual neighborhood condition, after completing questionnaires, and after 15 and 30 minutes watching a video). Psychophysiological measures are collected continuously and summarized for specific study epochs during the single study session (baseline, virtual neighborhood condition, questionnaire completion, and the first and final 15 minutes watching a video). For each outcome we will determine the best fitting model to capture change over time, such as linear or polynomial models, piecewise models, or models with time-varying predictors to indicate discrete study session epochs. We will then examine whether study group, or interactions between study groups and time, are significant and thus indicative of group differences in outcomes.

In addition, we will test the moderation effect of variables such as the characteristics of neighborhoods of residence and chronic stress by including an interaction term with study group to see if the effect of VR neighborhood condition differs across the levels of chronic neighborhood exposure or chronic stress. Although the role of sex as a biological variable is not a specific aim of the study, we recognize that sex differences may exist. Therefore, we will examine sex both as covariates and also in their interaction with experimental neighborhood condition, to examine if the effect of virtual neighborhood environment differs by sex.