Official Title: Development and Preliminary Examination of Two Brief Personalized Feedback Interventions Focused on Lab-based and EMA Alcohol Cues to Reduce Hazardous Young Adult Alcohol Use

Brief Title: Testing Brief Personalized Feedback Integrating Lab-based Alcohol Cue Information (Project ACE)

NCT number: NCT05873556

Document date: February 15, 2025

STATISTICAL ANALYSES

Prior to any inferential statistics, univariate and bivariate descriptive statistics will be used to assess distributions for baseline data and 2-week and 3-month follow-up data. Given the repeated measures design, generalized linear mixed models (GLMM; Raudenbush & Bryk, 2002) will be used. GLMM (aka hierarchical generalized linear models) allow for non-normal outcomes and missing data, handle varying time-points, and accommodate time-varying and time-invariant covariates. Separate models will test for intervention effects on craving, alcohol use, and consequences. Hypotheses compare the Cue Reactivity PFI to the assessment-only control (AOC). Models include three repeated measures (baseline, 2-week, 3-month) where Level 1 refers to repeated-measures and Level 2 refers to people. To determine whether the EMA-based PFI is associated with reduced drinking and negative consequences at the follow-ups, we will use Poisson forms of regression models, which are appropriate for count outcomes. The following equations represent the basic analytic model and serve as the basis to test intervention effects with drinking as an example:

Level 1: $\log(E[Alcohol_{ti}]) = \pi_{0i} + \pi_{1i}(Time1)_i + \pi_{2i}(Time2)_i + \varepsilon_{ti}$ $\quad \varepsilon_{ti} \sim N(0, I\sigma^2_{\varepsilon})$

Level 2: $\pi_{0i} = \beta_{00} + \beta_{01}(Intervention\ Condition)_i + r_{00i}$

$\pi_{1i} = \beta_{10} + \beta_{11}(Intervention\ Condition)_i + r_{10i}$

$\pi_{2i} = \beta_{20} + \beta_{21}(Intervention\ Condition)_i + r_{20i}$

where *t* indexes repeated-measures and *i* indexes participants. $Alcohol_{ti}$ represents the outcome measured at each time point for each individual. Time will be coded as two dummy variables that compare the 2-week (*Time1*) and 3-month (*Time2*) follow-ups to baseline (reference category). *Intervention Condition* will be a dummy variable to compare the PFI condition to the AOC condition (reference). Of particular interest are parameters that reflect the interaction between intervention condition and *Time* (e.g., β_{21} at 3-month). For count outcomes, the outcome is connected to covariates through a log link function, which is the standard link function for Poisson GLMM. Covariates can be exponentiated to yield Rate Ratios (RRs) that describe the proportional change in the count outcome associated with a 1-unit increase in the covariate. If data show over-dispersion where the variance exceeds the mean, the model will be extended to include a scale parameter to fit an over-dispersed Poisson, or we will consider zero-altered models to ensure accurate inferences (Atkins et al., 2013; Atkins & Gallop, 2007). We will also consider adding baseline covariates to improve precision or if evidence suggests an imbalance in the distribution of the covariate(s) across conditions.