

LetSync: Pilot Test of Mobile Health (mHealth) Intervention

Statistical Analysis Plan

LetSync R01

Methods for evaluating intervention efficacy. We will use linear mixed models (LMM) for continuous outcomes (e.g., ARV levels) and generalized linear mixed models (GLMM) for discrete (e.g., viral suppression) and non-normally distributed continuous outcomes (e.g., self-reported ART adherence) to test the hypotheses. GLMM fitted to discrete outcomes will employ a binomial distribution with a logit link; GLMM fitted to adherence outcomes will use a gamma distribution and log link. LMM and GLMM will incorporate random intercepts for couple ID and random intercepts and slopes for participant ID to account for non-independence of repeated observations and persons within couples (i.e., 3-level multilevel models). LMM will be estimated using restricted maximum likelihood whereas GLMM will be estimated using maximum likelihood via adaptive Gaussian quadrature.

Exploratory mediation and moderation analyses. We will use the causal inference-based approach of Valeri and VanderWeele, which yields optimal estimates of indirect effects in the presence of non-continuous outcomes (e.g., inclusion-of-others-in-self) and moderator-mediator interactions. We will use *Mplus* to fit mediation models to adjust standard errors for clustering of participants within dyads. We will explore potential moderators of the intervention effect (e.g., couple's resilience).

Secondary exploratory dyadic analyses. We will extend the analyses described above to include actor and partner effects for covariates and mediators. **Actor effects** describe the influence that one's standing on predictors or mediators (e.g., the index participant's dyadic coping score) has on one's own outcomes (e.g., self's ART adherence) whereas **partner effects** describe the influence that one's standing on independent variables has on the dependent variables of one's partner (e.g., the index participant's dyadic coping's effect on his partner's ART adherence). This technique illuminates the effects that partners can have on their own and their partner's behaviors, and may be used with either continuous or categorical dependent variables.