VA MapTrek- Yr 2

IRB #: 201901762

Statistical Analysis Plan

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VA MapTrek
Statistical Analysis Plan

We only used data from after the start of the intervention in our analysis; the baseline data was not used to estimate the model. We defined the start date of the intervention as Day 0 for all participants.

Statistical analysis was done using Bayesian mixed effects linear regression. We included fixed effects for day-of-week, days since the start of the intervention period, group indicator (Intervention Group versus Control Group), and an interaction between group and days since intervention period start. We included two random effects: random intercept and random slope by participant. The random effects were modeled using a bivariate normal distribution.

We included vague priors on all parameters. All model fixed effects had priors of U(-infinity, +infinity). We imposed slightly limited priors on the standard deviation of step counts within a person and the on-diagonal values of the covariance matrix for the random effects of U(0, 25,000). This upper bound of 25,000 was at 4-5x greater than the largest plausible values for these values and was set to accelerate sampling. The off-diagonal elements of the covariance matrix were given a Lewandowski, Kurowicka, and Joe prior with a shape parameter of 2. Our prior belief is that the random slope and intercept values will be correlated but we are very uncertain about the extent of that correlation. A shape parameter of two provides a weak prior in favor of correlation.

We estimated the model using Bayesian Hamiltonian Monte Carlo (HMC) simulation using Stan No-U-Turns sampler (NUTs). We ran 6 chains for 25,000 draws on each chain. We discarded the first 5,000 draws as burn-in and assumed the remaining 20,000 draws per chain reflected the posterior equilibrium. More convergence was assessed using Ř, effective sample size, and the Monte Carlo error relative to the total parameter error.