STATISTICAL ANALYSIS PLAN

Adherence Promotion with Person-Centered Technology (APPT) Trial: A Randomized Controlled Trial of a Tailored Smart Reminder System to Support Adherence to Home-Based Cognitive Training in Older Adults

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Study Site: Florida State University, Tallahassee, FL, USA

1. Purpose of This Plan

This document describes the statistical methods used to analyze data collected in the APPT trial, including the approach to the primary comparison between study arms, the approach to examining relationships between adherence and individual difference characteristics, the steps taken to check the assumptions underlying these methods, the procedure used to account for testing multiple variables, and the sensitivity analyses conducted to evaluate the robustness of the findings.

2. Analysis Population

The primary analysis population consists of all participants who were randomized to a study arm (smart reminder or control) and for whom adherence data were recorded during the intervention period. Analyses of predictors of adherence include all randomized participants with complete baseline predictor data; participants with missing values on a given predictor are excluded from analyses involving that specific predictor rather than from the dataset as a whole.

3. Primary Analysis: Between-Group Comparison of Adherence

The primary hypothesis, that participants in the smart reminder condition would show higher adherence than participants in the control condition, was tested using a between-subjects analysis of variance (ANOVA), with study arm as the independent (grouping) variable and overall adherence rate (number of training days completed) as the dependent variable.

4. Secondary Analysis: Predictors of Adherence

Relationships between adherence and continuously measured individual difference characteristics were examined using Pearson product-moment correlations between each predictor and the adherence rate.

5. Robustness (Sensitivity) Analyses

To evaluate whether the primary and secondary findings were sensitive to analytic choices, the following robustness checks were conducted:

6.1 Analyses with and Without Covariates

The primary between-group ANOVA and the secondary correlation analyses were repeated with relevant baseline covariates statistically controlled, using analysis of covariance (ANCOVA) for the group comparison and partial correlation for the predictor analyses. Results were compared to the unadjusted models to determine whether adjustment for covariates materially changed the the statistical significance of the findings.

6.2 Multiple Linear Regression

As an additional robustness check and to evaluate the combined and independent contribution of individual difference characteristics to adherence, a multiple linear regression model was estimated with adherence rate as the outcome and the full set of candidate predictors entered as simultaneous predictors, with study arm included as a covariate. Standardized regression coefficients, along with associated confidence intervals and p-values, were used to evaluate the unique contribution of each predictor after accounting for the others.

6.3 Consistency of Results

Across the robustness checks described above, the pattern of results, including the direction and general magnitude of the group difference in adherence and the direction of associations between individual difference characteristics and adherence, was largely consistent between the unadjusted and covariate-adjusted analyses, and between the correlation-based and multiple regression-based approaches to identifying predictors of adherence. No substantive

changes in the overall pattern of findings were observed when covariates were added or when predictors were evaluated jointly rather than individually.

7. Handling of Missing Data

Missingness on individual baseline predictor measures was evaluated descriptively. Analyses involving a specific predictor used all available cases for that predictor (pairwise deletion) rather than excluding participants with missing data on unrelated measures. For the multiple regression model, cases with missing data on any predictor included in that specific model were excluded (listwise deletion) for that analysis; the extent of resulting sample reduction, if any, is reported alongside model results.

8. Software

Statistical analyses were conducted using JASP 0.19.03.

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