Effects of an Active Musical Intervention on the Health of Older Adults Living With Dementia: the DeMúsica Study, a Cross-over Trial on a Non-pharmacological Intervention

NCT number: not assigned

Date of the document: September 24th 2025

Statistical Analysis Plan

A randomized, blinded, crossover study design will be conducted to test the effects on multiple health-related outcomes in older adults (see Figure 4).

Participants will be randomized to receive the intervention either in the first or in the second study period (see Figure 4). As detailed in the following section, the intervention requires groups of eight participants to enable individualized delivery of the activities in each session. Therefore, two groups of eight (16 participants in total) will initially receive the music sessions, and the other two groups will receive the sessions 6 months later. Outcome assessments will be conducted between intervention periods by staff blinded to each group's intervention timing. Randomization will be performed by an independent investigator, with the unit of randomization defined as the dyad consisting of the participant and their caregiver. After database integration and cleaning, descriptive statistics will be generated for all variables. Means and standard deviations will be reported for continuous variables with approximately normal distributions, whereas medians and interquartile ranges will be reported for variables that are non-normally distributed and do not achieve normality despite transformation (e.g., quadratic, logarithmic, reciprocal). For dichotomous and ordinal data, absolute and relative frequencies will be reported. Data will also be visualized using appropriate plots (e.g., bar charts, box-and-whisker plots, scatterplots), depending on variable type. Subsequently, bivariate analyses and hypothesis testing will be performed according to the type of variable under analysis. Student's t test will be used for independent continuous outcomes, and paired t tests will be used for related continuous outcomes (pre–post). When more than one assessment time point is analyzed, two-way ANOVA will be used. For dichotomous and ordinal variables, Fisher's exact test or the chi-square test will be applied, as appropriate. Based on the bivariate analysis, participants will be aligned according to study

period (i.e., grouped by intervention status). At this stage, achieved statistical power will also be calculated using the final sample for each outcome variable. Finally, linear mixed-effects regression models will be fit, adjusted for age and sex (Model 1), and for age, sex, marital status, educational attainment, time since diagnosis, and current medical treatment (Model 2). Given that an intention-to-treat analysis will be conducted, sensitivity analyses will be performed in the event of loss to follow-up to assess changes in estimates when missing values are imputed using the following approaches: maximum values, minimum values, and randomly assigned values.

For the statistical analysis, mixed-effects models will be used, which allow analysis of hierarchically structured data and account for within-subject correlation among repeated observations over time. These models will be fit for continuous and categorical dependent variables, as appropriate, using restricted maximum likelihood procedures. Fixed effects will include group, time, and their interaction, and random effects will include a participant-specific intercept and slope, thereby capturing inter-individual variability in response to the intervention.

Model coefficients (beta estimates) will be reported along with 95% confidence intervals. Information criteria (AIC and BIC) will be used to assess model fit and parsimony. Assumption checking will include residual diagnostics, assessment of normality and homoscedasticity, and evaluation of potential outliers or influential observations.

In addition, sensitivity analyses will be conducted using multiple imputation to address potential missing data between assessments. Finally, results will be interpreted based on the magnitude and statistical significance of the estimated effects, providing a robust and interpretable assessment of the intervention's impact.