Assignment 03

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library(ez)   
library(nlme)

mydata <- read.csv("../data/mydata.csv")  
  
# To run the ANOVA, I need to filter out some participants that don't have all three time points  
mydata\_clean <- mydata[!is.na(mydata$insomnia\_severity), ]  
timepoint\_counts <- table(mydata\_clean$record\_id)  
complete\_ids <- names(timepoint\_counts[timepoint\_counts == 3])  
mydata\_complete <- mydata\_clean[mydata\_clean$record\_id %in% complete\_ids, ]  
mydata\_complete$redcap\_event\_name <- factor(mydata\_complete$redcap\_event\_name)

1. Select a variable in your data for modeling over time. (1 variable, at least 3 occasions). Use the same variable and data as Assignment 2.

Consistent with last week’s assignment, I will work with the outcome of insomnia severity.

1. Repeated Measures ANOVA
2. Run repeated measures ANOVA using the ezANOVA function in the ez package

m1 <- ezANOVA(data=mydata\_complete, dv=insomnia\_severity, wid=record\_id, within=redcap\_event\_name)

1. Decide whether you use the univariate or multivariate test, and justify your decision

Because the Mauchly’s test for sphericity is significant (W = 0.88, *p* < 0.001), we assume there is a violation of heterogeneity of variances and use the multivariate test.

1. If you decide to use the univariate test, test for polynomial contrasts (e.g., linear, quadratic time effects) with proper time spacing using the aov function
2. If you decide to use the multivariate test, run the multivariate test (i.e., the MANOVA approach)

# contrasts for uneaqually spaced time  
contrasts(mydata\_complete$redcap\_event\_name) <- contr.poly(c(0, 1.5, 6))  
  
mUN <- gls(insomnia\_severity ~ redcap\_event\_name, corr = corSymm(form = ~1|record\_id), weights = varIdent(form = ~ 1 | redcap\_event\_name),   
 method="ML",data=mydata\_complete)  
  
mCS <- gls(insomnia\_severity ~ redcap\_event\_name, corr = corCompSymm(form = ~1|record\_id), method="ML", data=mydata\_complete)  
  
anova(mUN, mCS)

## Model df AIC BIC logLik Test L.Ratio p-value  
## mUN 1 9 3316.165 3355.323 -1649.082   
## mCS 2 5 3392.484 3414.238 -1691.242 1 vs 2 84.31886 <.0001

1. Write a few sentences reporting the results and their interpretation.

I examined how insomnia severity changed over three measurement occasions (baseline, posttreatment, and followup) in a sample of 191 participants. The assumption of equal variance and covariance, tested with the Mauchly’s test of Sphericity did not adequately describe the data, as indicated by the significant p-value of the test. Therefore, I fitted a multivariate ANOVA model, in which each variance and covariance was estimated separately. The Unstructured model fitted significantly better than a model assuming Compound Symmetry ((4) = 84.32, *p* < 0.001), and had lower AIC (3316.17 vs. 3392.48) and BIC (3355.32 vs. 3414.24). Significant mean differences in insomnia severity were observed across occasions within the multivariate model, F(1, 2) = 16.72, p < .001.

1. Include the code you used to complete the assignment.