Chapter 6 Analyses and Output

RSF

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#######################################################################################  
# Chapter 7 Data Analyses  
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# Last edited: 2019-11-27  
#######################################################################################  
  
  
####LOAD PACKAGES####  
  
if (!require("pacman")) install.packages("pacman")

## Loading required package: pacman

## Warning: package 'pacman' was built under R version 3.5.3

pacman::p\_load(readxl, plyr, psych, lme4,nlme, robustlmm, car, lsmeans,lmerTest, mice, ggplot2, emmeans, dplyr)  
setwd("C:/Users/rfalck/Desktop/UBC-PhD/Thesis Material/Thesis defense materials/Theis Data and Analyses")#Directory where you put the spreadsheet  
Monitor\_Final\_Long\_Dec2017 <- read\_excel("Chapter 6 Data.xlsx")  
####PREPARE DATA SET####  
  
Monitor\_Final\_Long\_Dec2017$Tx<-NA  
Monitor\_Final\_Long\_Dec2017$Tx[Monitor\_Final\_Long\_Dec2017$`Treatment Group`==1]<-"Immediate"  
Monitor\_Final\_Long\_Dec2017$Tx[Monitor\_Final\_Long\_Dec2017$`Treatment Group`==2]<-"Delayed"  
  
data1<-Monitor\_Final\_Long\_Dec2017[c(1,313,6:9,15:16,18,94,170,246,20,96,172,248,25,101,177,253,28,104,180,256,  
 32,33,108,109,184,185,260,261,76,78,80,82,83,152,154,156,158,159,228,230,232,  
 234,235,304,306,308,310,311,36:38,40,43,46,41,44,47,112:114,116,119,122,117,120,123,  
 188:190,192,195,198,193,196,199,264:266,268,271,274,269,272,275)]  
  
ID\_number<-substr(data1$ID,4,7)  
ID\_number<-as.vector(ID\_number)  
ID\_number<-as.numeric(ID\_number)  
data1$ID\_number<-ID\_number  
data1$Steps.1<-as.numeric(gsub(",","",data1$Steps.1))  
  
data2<- data1[c(1:8,13:20,36:37,41:42,46:47,51:52)]  
  
#Change Scores  
data2$SB.Changes1 <- data2$SB\_Min.1 - data2$SB\_Min.2   
data2$SB.Changes2 <- data2$SB\_Min.1 - data2$SB\_Min.3   
  
data2$SB.Changes <- NULL  
data2$SB.Changes <- ifelse(data2$Tx =="Immediate", data2$SB.Changes1, data2$SB.Changes2)  
  
  
#Creating MVPA Change Scores#  
data2$MVPA.Changes1 <- data2$MVPA\_Min.2 - data2$MVPA\_Min.1   
data2$MVPA.Changes2 <- data2$MVPA\_Min.3 - data2$MVPA\_Min.1   
  
data2$MVPA.Changes <- NULL  
data2$MVPA.Changes <- ifelse(data2$Tx =="Immediate", data2$MVPA.Changes1, data2$MVPA.Changes2)  
  
  
##Creating List Sorting Change Scores##  
  
data2$List.Sorting.Change1 <- data2$WM.AgeCorrectedScore.2 - data2$WM.AgeCorrectedScore.2   
data2$List.Sorting.Change2 <- data2$WM.AgeCorrectedScore.3 - data2$WM.AgeCorrectedScore.1   
  
data2$List.Sorting.Change <- NULL  
data2$List.Sorting.Change <- ifelse(data1$Tx =="Immediate", data2$List.Sorting.Change1, data2$List.Sorting.Change2)  
  
  
  
##Creating Picture Sequence Memory Change Scores##  
  
data2$PSM.Change1 <- data2$PSM.AgeCorrectedScore.2 - data2$PSM.AgeCorrectedScore.1   
data2$PSM.Change2 <- data2$PSM.AgeCorrectedScore.3 - data2$PSM.AgeCorrectedScore.1   
  
data2$PSM.Change <- NULL  
data2$PSM.Change <- ifelse(data1$Tx =="Immediate", data2$PSM.Change1, data2$PSM.Change2)  
  
data2$txr<-relevel(as.factor(data2$Tx),ref = "Immediate")  
  
  
  
  
  
#FINAL DATA SET#  
Final<-data2  
  
  
#Baseline Statistics------------------------------------  
  
describe(Final$Age)

## vars n mean sd median trimmed mad min max range skew kurtosis se  
## X1 1 61 62.18 8.91 62 62.18 8.9 41 83 42 0.02 -0.08 1.14

describeBy(Final$Age, group= Final$Tx)

##   
## Descriptive statistics by group   
## group: Delayed  
## vars n mean sd median trimmed mad min max range skew kurtosis se  
## X1 1 31 62.61 8.54 62 62.6 8.9 41 83 42 -0.07 0.04 1.53  
## --------------------------------------------------------   
## group: Immediate  
## vars n mean sd median trimmed mad min max range skew kurtosis se  
## X1 1 30 61.73 9.4 61 61.58 7.41 42 82 40 0.11 -0.34 1.72

table(Final$Sex, Final$Tx)

##   
## Delayed Immediate  
## Female 28 22  
## Male 3 8

table(Final$Race, Final$Tx)

##   
## Delayed Immediate  
## Asian 4 5  
## Black 1 0  
## Other 2 1  
## White 24 24

table(Final$Education, Final$Tx)

##   
## Delayed Immediate  
## Associates Degree 2 4  
## Bachelors degree 8 9  
## High School Graduate 5 3  
## High Scool Graduate 1 0  
## Masters degree 2 0  
## None 0 1  
## Postgraduate degree 6 6  
## Primary School 0 1  
## Some College 7 6

describe(Final$MoCA)

## vars n mean sd median trimmed mad min max range skew kurtosis  
## X1 1 59 26.76 2.72 27 27.08 1.48 14 30 16 -2.13 6.96  
## se  
## X1 0.35

describeBy(Final$MoCA, group= Final$Tx)

##   
## Descriptive statistics by group   
## group: Delayed  
## vars n mean sd median trimmed mad min max range skew kurtosis  
## X1 1 29 26.24 2.86 27 26.6 1.48 14 29 15 -2.58 8.77  
## se  
## X1 0.53  
## --------------------------------------------------------   
## group: Immediate  
## vars n mean sd median trimmed mad min max range skew kurtosis  
## X1 1 30 27.27 2.53 28 27.62 2.22 19 30 11 -1.46 2.37  
## se  
## X1 0.46

describe(Final$MMSE)

## vars n mean sd median trimmed mad min max range skew kurtosis se  
## X1 1 59 28.32 2.1 29 28.69 1.48 17 30 13 -3 12.4 0.27

describeBy(Final$MMSE, group= Final$Tx)

##   
## Descriptive statistics by group   
## group: Delayed  
## vars n mean sd median trimmed mad min max range skew kurtosis  
## X1 1 29 28.62 1.35 29 28.84 1.48 24 30 6 -1.86 3.81  
## se  
## X1 0.25  
## --------------------------------------------------------   
## group: Immediate  
## vars n mean sd median trimmed mad min max range skew kurtosis  
## X1 1 30 28.03 2.62 29 28.54 1.48 17 30 13 -2.55 7.86  
## se  
## X1 0.48

describe(Final$SB\_Min.1)

## vars n mean sd median trimmed mad min max range skew  
## X1 1 61 692.68 138.24 694 693.94 137.63 355.5 1008.17 652.67 -0.08  
## kurtosis se  
## X1 -0.31 17.7

describeBy(Final$SB\_Min.1, group= Final$Tx)

##   
## Descriptive statistics by group   
## group: Delayed  
## vars n mean sd median trimmed mad min max range skew  
## X1 1 31 703.05 161.17 726 705.86 125.28 355.5 1008.17 652.67 -0.16  
## kurtosis se  
## X1 -0.58 28.95  
## --------------------------------------------------------   
## group: Immediate  
## vars n mean sd median trimmed mad min max range skew  
## X1 1 30 681.96 111.51 672.58 683.71 133.43 453 859.17 406.17 -0.11  
## kurtosis se  
## X1 -1.02 20.36

describe(Final$MVPA\_Min.1)

## vars n mean sd median trimmed mad min max range skew  
## X1 1 61 84.84 74.18 66.33 73.22 56.09 1 374.17 373.17 1.69  
## kurtosis se  
## X1 3.33 9.5

describeBy(data2$MVPA\_Min.1, group= data2$Tx)

##   
## Descriptive statistics by group   
## group: Delayed  
## vars n mean sd median trimmed mad min max range skew kurtosis  
## X1 1 31 86.19 86.19 57.5 70.01 54.6 6.5 374.17 367.67 1.83 3.01  
## se  
## X1 15.48  
## --------------------------------------------------------   
## group: Immediate  
## vars n mean sd median trimmed mad min max range skew kurtosis  
## X1 1 30 83.44 60.8 67.25 76.94 60.42 1 250 249 0.8 0.01  
## se  
## X1 11.1

describe(Final$WM.AgeCorrectedScore.1)

## vars n mean sd median trimmed mad min max range skew kurtosis  
## X1 1 57 102.24 13.72 103.11 102.02 13.8 73 139.11 66.11 0.19 -0.28  
## se  
## X1 1.82

describeBy(Final$WM.AgeCorrectedScore.1, group= Final$Tx)

##   
## Descriptive statistics by group   
## group: Delayed  
## vars n mean sd median trimmed mad min max range skew  
## X1 1 28 102.42 14.64 102.56 102.59 17.13 73 129.84 56.84 -0.03  
## kurtosis se  
## X1 -0.97 2.77  
## --------------------------------------------------------   
## group: Immediate  
## vars n mean sd median trimmed mad min max range skew kurtosis  
## X1 1 29 102.05 13.03 103.11 101.48 9.06 77 139.11 62.11 0.47 0.47  
## se  
## X1 2.42

describe(Final$PSM.AgeCorrectedScore.1)

## vars n mean sd median trimmed mad min max range skew kurtosis  
## X1 1 57 107.19 16.74 103 106.46 17.79 71 146 75 0.36 -0.55  
## se  
## X1 2.22

describeBy(Final$PSM.AgeCorrectedScore.1, group= Final$Tx)

##   
## Descriptive statistics by group   
## group: Delayed  
## vars n mean sd median trimmed mad min max range skew kurtosis  
## X1 1 28 112.53 14.67 114.5 111.95 17.15 88 146 58 0.32 -0.84  
## se  
## X1 2.77  
## --------------------------------------------------------   
## group: Immediate  
## vars n mean sd median trimmed mad min max range skew kurtosis  
## X1 1 29 102.04 17.22 99 100.95 17.79 71 146 75 0.7 -0.12  
## se  
## X1 3.2

#Multiple Imputation----------------------------------------------  
  
  
##IMPUTATION 5 data sets, 20 iterations  
set.seed(1234)  
tempdata <- mice(Final, m=5, maxit=20)

##   
## iter imp variable  
## 1 1 MoCA MMSE SB\_Min.2 SB\_Min.3 SB\_Min.4 MVPA\_Min.2 MVPA\_Min.3\* MVPA\_Min.4 WM.AgeCorrectedScore.1 PSM.AgeCorrectedScore.1 WM.AgeCorrectedScore.2 PSM.AgeCorrectedScore.2 WM.AgeCorrectedScore.3\* PSM.AgeCorrectedScore.3 WM.AgeCorrectedScore.4 PSM.AgeCorrectedScore.4 SB.Changes1 SB.Changes2\* SB.Changes MVPA.Changes1 MVPA.Changes2\* MVPA.Changes List.Sorting.Change2 List.Sorting.Change PSM.Change1 PSM.Change2 PSM.Change  
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## 16 1 MoCA MMSE SB\_Min.2 SB\_Min.3 SB\_Min.4 MVPA\_Min.2 MVPA\_Min.3 MVPA\_Min.4 WM.AgeCorrectedScore.1 PSM.AgeCorrectedScore.1 WM.AgeCorrectedScore.2 PSM.AgeCorrectedScore.2 WM.AgeCorrectedScore.3 PSM.AgeCorrectedScore.3 WM.AgeCorrectedScore.4 PSM.AgeCorrectedScore.4 SB.Changes1 SB.Changes2\* SB.Changes MVPA.Changes1 MVPA.Changes2 MVPA.Changes List.Sorting.Change2\* List.Sorting.Change PSM.Change1 PSM.Change2\* PSM.Change  
## 16 2 MoCA MMSE SB\_Min.2 SB\_Min.3\* SB\_Min.4 MVPA\_Min.2 MVPA\_Min.3 MVPA\_Min.4 WM.AgeCorrectedScore.1 PSM.AgeCorrectedScore.1 WM.AgeCorrectedScore.2 PSM.AgeCorrectedScore.2 WM.AgeCorrectedScore.3 PSM.AgeCorrectedScore.3 WM.AgeCorrectedScore.4 PSM.AgeCorrectedScore.4 SB.Changes1 SB.Changes2 SB.Changes MVPA.Changes1 MVPA.Changes2 MVPA.Changes List.Sorting.Change2\* List.Sorting.Change PSM.Change1 PSM.Change2 PSM.Change\*  
## 16 3 MoCA MMSE SB\_Min.2 SB\_Min.3 SB\_Min.4 MVPA\_Min.2 MVPA\_Min.3 MVPA\_Min.4 WM.AgeCorrectedScore.1 PSM.AgeCorrectedScore.1 WM.AgeCorrectedScore.2 PSM.AgeCorrectedScore.2 WM.AgeCorrectedScore.3\* PSM.AgeCorrectedScore.3 WM.AgeCorrectedScore.4 PSM.AgeCorrectedScore.4 SB.Changes1 SB.Changes2 SB.Changes MVPA.Changes1 MVPA.Changes2\* MVPA.Changes List.Sorting.Change2\* List.Sorting.Change PSM.Change1 PSM.Change2\* PSM.Change  
## 16 4 MoCA MMSE SB\_Min.2 SB\_Min.3 SB\_Min.4 MVPA\_Min.2 MVPA\_Min.3\* MVPA\_Min.4 WM.AgeCorrectedScore.1 PSM.AgeCorrectedScore.1 WM.AgeCorrectedScore.2 PSM.AgeCorrectedScore.2 WM.AgeCorrectedScore.3\* PSM.AgeCorrectedScore.3 WM.AgeCorrectedScore.4 PSM.AgeCorrectedScore.4 SB.Changes1 SB.Changes2\* SB.Changes MVPA.Changes1 MVPA.Changes2\* MVPA.Changes List.Sorting.Change2\* List.Sorting.Change PSM.Change1 PSM.Change2\* PSM.Change  
## 16 5 MoCA MMSE SB\_Min.2 SB\_Min.3\* SB\_Min.4 MVPA\_Min.2 MVPA\_Min.3 MVPA\_Min.4 WM.AgeCorrectedScore.1 PSM.AgeCorrectedScore.1 WM.AgeCorrectedScore.2 PSM.AgeCorrectedScore.2 WM.AgeCorrectedScore.3 PSM.AgeCorrectedScore.3 WM.AgeCorrectedScore.4 PSM.AgeCorrectedScore.4 SB.Changes1 SB.Changes2\* SB.Changes MVPA.Changes1 MVPA.Changes2 MVPA.Changes List.Sorting.Change2\* List.Sorting.Change PSM.Change1 PSM.Change2 PSM.Change  
## 17 1 MoCA MMSE SB\_Min.2 SB\_Min.3\* SB\_Min.4 MVPA\_Min.2 MVPA\_Min.3 MVPA\_Min.4 WM.AgeCorrectedScore.1 PSM.AgeCorrectedScore.1 WM.AgeCorrectedScore.2 PSM.AgeCorrectedScore.2 WM.AgeCorrectedScore.3\* PSM.AgeCorrectedScore.3 WM.AgeCorrectedScore.4 PSM.AgeCorrectedScore.4 SB.Changes1 SB.Changes2\* SB.Changes MVPA.Changes1 MVPA.Changes2\* MVPA.Changes List.Sorting.Change2\* List.Sorting.Change PSM.Change1\* PSM.Change2\* PSM.Change  
## 17 2 MoCA MMSE SB\_Min.2 SB\_Min.3\* SB\_Min.4 MVPA\_Min.2 MVPA\_Min.3\* MVPA\_Min.4 WM.AgeCorrectedScore.1 PSM.AgeCorrectedScore.1 WM.AgeCorrectedScore.2 PSM.AgeCorrectedScore.2 WM.AgeCorrectedScore.3 PSM.AgeCorrectedScore.3 WM.AgeCorrectedScore.4 PSM.AgeCorrectedScore.4 SB.Changes1 SB.Changes2 SB.Changes MVPA.Changes1 MVPA.Changes2 MVPA.Changes List.Sorting.Change2\* List.Sorting.Change PSM.Change1 PSM.Change2\* PSM.Change  
## 17 3 MoCA MMSE SB\_Min.2 SB\_Min.3 SB\_Min.4 MVPA\_Min.2 MVPA\_Min.3 MVPA\_Min.4 WM.AgeCorrectedScore.1 PSM.AgeCorrectedScore.1 WM.AgeCorrectedScore.2 PSM.AgeCorrectedScore.2 WM.AgeCorrectedScore.3\* PSM.AgeCorrectedScore.3\* WM.AgeCorrectedScore.4 PSM.AgeCorrectedScore.4 SB.Changes1 SB.Changes2 SB.Changes MVPA.Changes1 MVPA.Changes2 MVPA.Changes List.Sorting.Change2\* List.Sorting.Change PSM.Change1 PSM.Change2\* PSM.Change  
## 17 4 MoCA MMSE SB\_Min.2 SB\_Min.3\* SB\_Min.4 MVPA\_Min.2 MVPA\_Min.3\* MVPA\_Min.4 WM.AgeCorrectedScore.1 PSM.AgeCorrectedScore.1 WM.AgeCorrectedScore.2 PSM.AgeCorrectedScore.2 WM.AgeCorrectedScore.3 PSM.AgeCorrectedScore.3\* WM.AgeCorrectedScore.4 PSM.AgeCorrectedScore.4 SB.Changes1 SB.Changes2 SB.Changes MVPA.Changes1 MVPA.Changes2 MVPA.Changes List.Sorting.Change2 List.Sorting.Change PSM.Change1 PSM.Change2 PSM.Change  
## 17 5 MoCA MMSE SB\_Min.2 SB\_Min.3\* SB\_Min.4 MVPA\_Min.2 MVPA\_Min.3 MVPA\_Min.4 WM.AgeCorrectedScore.1 PSM.AgeCorrectedScore.1 WM.AgeCorrectedScore.2 PSM.AgeCorrectedScore.2 WM.AgeCorrectedScore.3 PSM.AgeCorrectedScore.3 WM.AgeCorrectedScore.4 PSM.AgeCorrectedScore.4 SB.Changes1 SB.Changes2 SB.Changes MVPA.Changes1 MVPA.Changes2 MVPA.Changes List.Sorting.Change2\* List.Sorting.Change PSM.Change1 PSM.Change2 PSM.Change  
## 18 1 MoCA MMSE SB\_Min.2 SB\_Min.3 SB\_Min.4 MVPA\_Min.2 MVPA\_Min.3\* MVPA\_Min.4 WM.AgeCorrectedScore.1 PSM.AgeCorrectedScore.1 WM.AgeCorrectedScore.2 PSM.AgeCorrectedScore.2 WM.AgeCorrectedScore.3\* PSM.AgeCorrectedScore.3\* WM.AgeCorrectedScore.4 PSM.AgeCorrectedScore.4 SB.Changes1 SB.Changes2 SB.Changes MVPA.Changes1 MVPA.Changes2\* MVPA.Changes List.Sorting.Change2\* List.Sorting.Change PSM.Change1 PSM.Change2\* PSM.Change  
## 18 2 MoCA MMSE SB\_Min.2 SB\_Min.3 SB\_Min.4 MVPA\_Min.2 MVPA\_Min.3\* MVPA\_Min.4 WM.AgeCorrectedScore.1 PSM.AgeCorrectedScore.1 WM.AgeCorrectedScore.2 PSM.AgeCorrectedScore.2 WM.AgeCorrectedScore.3 PSM.AgeCorrectedScore.3 WM.AgeCorrectedScore.4 PSM.AgeCorrectedScore.4 SB.Changes1 SB.Changes2 SB.Changes MVPA.Changes1 MVPA.Changes2\* MVPA.Changes List.Sorting.Change2 List.Sorting.Change PSM.Change1 PSM.Change2\* PSM.Change  
## 18 3 MoCA MMSE SB\_Min.2 SB\_Min.3\* SB\_Min.4 MVPA\_Min.2 MVPA\_Min.3\* MVPA\_Min.4 WM.AgeCorrectedScore.1 PSM.AgeCorrectedScore.1 WM.AgeCorrectedScore.2 PSM.AgeCorrectedScore.2 WM.AgeCorrectedScore.3 PSM.AgeCorrectedScore.3 WM.AgeCorrectedScore.4 PSM.AgeCorrectedScore.4 SB.Changes1 SB.Changes2\* SB.Changes MVPA.Changes1 MVPA.Changes2\* MVPA.Changes List.Sorting.Change2 List.Sorting.Change PSM.Change1 PSM.Change2\* PSM.Change  
## 18 4 MoCA MMSE SB\_Min.2 SB\_Min.3\* SB\_Min.4 MVPA\_Min.2 MVPA\_Min.3\* MVPA\_Min.4 WM.AgeCorrectedScore.1 PSM.AgeCorrectedScore.1 WM.AgeCorrectedScore.2 PSM.AgeCorrectedScore.2 WM.AgeCorrectedScore.3 PSM.AgeCorrectedScore.3 WM.AgeCorrectedScore.4 PSM.AgeCorrectedScore.4 SB.Changes1 SB.Changes2 SB.Changes MVPA.Changes1 MVPA.Changes2\* MVPA.Changes List.Sorting.Change2\* List.Sorting.Change PSM.Change1 PSM.Change2\* PSM.Change  
## 18 5 MoCA MMSE SB\_Min.2 SB\_Min.3 SB\_Min.4 MVPA\_Min.2 MVPA\_Min.3\* MVPA\_Min.4 WM.AgeCorrectedScore.1 PSM.AgeCorrectedScore.1 WM.AgeCorrectedScore.2 PSM.AgeCorrectedScore.2 WM.AgeCorrectedScore.3 PSM.AgeCorrectedScore.3 WM.AgeCorrectedScore.4 PSM.AgeCorrectedScore.4 SB.Changes1 SB.Changes2\* SB.Changes MVPA.Changes1 MVPA.Changes2\* MVPA.Changes List.Sorting.Change2 List.Sorting.Change PSM.Change1 PSM.Change2\* PSM.Change  
## 19 1 MoCA MMSE SB\_Min.2 SB\_Min.3\* SB\_Min.4 MVPA\_Min.2 MVPA\_Min.3\* MVPA\_Min.4 WM.AgeCorrectedScore.1 PSM.AgeCorrectedScore.1 WM.AgeCorrectedScore.2 PSM.AgeCorrectedScore.2 WM.AgeCorrectedScore.3 PSM.AgeCorrectedScore.3 WM.AgeCorrectedScore.4 PSM.AgeCorrectedScore.4 SB.Changes1 SB.Changes2\* SB.Changes MVPA.Changes1 MVPA.Changes2 MVPA.Changes List.Sorting.Change2\* List.Sorting.Change PSM.Change1 PSM.Change2 PSM.Change  
## 19 2 MoCA MMSE SB\_Min.2 SB\_Min.3 SB\_Min.4 MVPA\_Min.2 MVPA\_Min.3 MVPA\_Min.4 WM.AgeCorrectedScore.1 PSM.AgeCorrectedScore.1 WM.AgeCorrectedScore.2 PSM.AgeCorrectedScore.2 WM.AgeCorrectedScore.3\* PSM.AgeCorrectedScore.3 WM.AgeCorrectedScore.4 PSM.AgeCorrectedScore.4 SB.Changes1 SB.Changes2 SB.Changes MVPA.Changes1 MVPA.Changes2 MVPA.Changes List.Sorting.Change2\* List.Sorting.Change PSM.Change1 PSM.Change2\* PSM.Change  
## 19 3 MoCA MMSE SB\_Min.2 SB\_Min.3\* SB\_Min.4 MVPA\_Min.2 MVPA\_Min.3 MVPA\_Min.4 WM.AgeCorrectedScore.1 PSM.AgeCorrectedScore.1 WM.AgeCorrectedScore.2 PSM.AgeCorrectedScore.2 WM.AgeCorrectedScore.3 PSM.AgeCorrectedScore.3 WM.AgeCorrectedScore.4 PSM.AgeCorrectedScore.4 SB.Changes1 SB.Changes2\* SB.Changes MVPA.Changes1 MVPA.Changes2 MVPA.Changes List.Sorting.Change2\* List.Sorting.Change PSM.Change1 PSM.Change2\* PSM.Change  
## 19 4 MoCA MMSE SB\_Min.2 SB\_Min.3\* SB\_Min.4 MVPA\_Min.2 MVPA\_Min.3 MVPA\_Min.4 WM.AgeCorrectedScore.1 PSM.AgeCorrectedScore.1 WM.AgeCorrectedScore.2 PSM.AgeCorrectedScore.2 WM.AgeCorrectedScore.3\* PSM.AgeCorrectedScore.3\* WM.AgeCorrectedScore.4 PSM.AgeCorrectedScore.4 SB.Changes1 SB.Changes2\* SB.Changes MVPA.Changes1 MVPA.Changes2\* MVPA.Changes List.Sorting.Change2\* List.Sorting.Change PSM.Change1 PSM.Change2 PSM.Change  
## 19 5 MoCA MMSE SB\_Min.2 SB\_Min.3 SB\_Min.4 MVPA\_Min.2 MVPA\_Min.3\* MVPA\_Min.4 WM.AgeCorrectedScore.1 PSM.AgeCorrectedScore.1 WM.AgeCorrectedScore.2 PSM.AgeCorrectedScore.2 WM.AgeCorrectedScore.3 PSM.AgeCorrectedScore.3 WM.AgeCorrectedScore.4 PSM.AgeCorrectedScore.4 SB.Changes1 SB.Changes2 SB.Changes MVPA.Changes1 MVPA.Changes2 MVPA.Changes List.Sorting.Change2\* List.Sorting.Change PSM.Change1 PSM.Change2\* PSM.Change  
## 20 1 MoCA MMSE SB\_Min.2 SB\_Min.3\* SB\_Min.4 MVPA\_Min.2 MVPA\_Min.3\* MVPA\_Min.4 WM.AgeCorrectedScore.1 PSM.AgeCorrectedScore.1 WM.AgeCorrectedScore.2 PSM.AgeCorrectedScore.2 WM.AgeCorrectedScore.3 PSM.AgeCorrectedScore.3 WM.AgeCorrectedScore.4 PSM.AgeCorrectedScore.4 SB.Changes1 SB.Changes2\* SB.Changes MVPA.Changes1 MVPA.Changes2 MVPA.Changes List.Sorting.Change2\* List.Sorting.Change PSM.Change1 PSM.Change2 PSM.Change  
## 20 2 MoCA MMSE SB\_Min.2 SB\_Min.3 SB\_Min.4 MVPA\_Min.2 MVPA\_Min.3\* MVPA\_Min.4 WM.AgeCorrectedScore.1 PSM.AgeCorrectedScore.1 WM.AgeCorrectedScore.2 PSM.AgeCorrectedScore.2 WM.AgeCorrectedScore.3\* PSM.AgeCorrectedScore.3 WM.AgeCorrectedScore.4 PSM.AgeCorrectedScore.4 SB.Changes1 SB.Changes2\* SB.Changes MVPA.Changes1 MVPA.Changes2\* MVPA.Changes List.Sorting.Change2\* List.Sorting.Change PSM.Change1 PSM.Change2\* PSM.Change  
## 20 3 MoCA MMSE SB\_Min.2 SB\_Min.3 SB\_Min.4 MVPA\_Min.2 MVPA\_Min.3\* MVPA\_Min.4 WM.AgeCorrectedScore.1 PSM.AgeCorrectedScore.1 WM.AgeCorrectedScore.2 PSM.AgeCorrectedScore.2 WM.AgeCorrectedScore.3\* PSM.AgeCorrectedScore.3\* WM.AgeCorrectedScore.4 PSM.AgeCorrectedScore.4 SB.Changes1 SB.Changes2 SB.Changes MVPA.Changes1 MVPA.Changes2\* MVPA.Changes List.Sorting.Change2 List.Sorting.Change PSM.Change1 PSM.Change2 PSM.Change  
## 20 4 MoCA MMSE SB\_Min.2 SB\_Min.3\* SB\_Min.4 MVPA\_Min.2 MVPA\_Min.3 MVPA\_Min.4 WM.AgeCorrectedScore.1 PSM.AgeCorrectedScore.1 WM.AgeCorrectedScore.2 PSM.AgeCorrectedScore.2 WM.AgeCorrectedScore.3 PSM.AgeCorrectedScore.3 WM.AgeCorrectedScore.4 PSM.AgeCorrectedScore.4 SB.Changes1 SB.Changes2\* SB.Changes MVPA.Changes1 MVPA.Changes2 MVPA.Changes List.Sorting.Change2\* List.Sorting.Change PSM.Change1 PSM.Change2\* PSM.Change  
## 20 5 MoCA MMSE SB\_Min.2 SB\_Min.3\* SB\_Min.4 MVPA\_Min.2 MVPA\_Min.3\* MVPA\_Min.4 WM.AgeCorrectedScore.1 PSM.AgeCorrectedScore.1 WM.AgeCorrectedScore.2 PSM.AgeCorrectedScore.2 WM.AgeCorrectedScore.3 PSM.AgeCorrectedScore.3 WM.AgeCorrectedScore.4 PSM.AgeCorrectedScore.4 SB.Changes1 SB.Changes2\* SB.Changes MVPA.Changes1 MVPA.Changes2\* MVPA.Changes List.Sorting.Change2 List.Sorting.Change PSM.Change1 PSM.Change2\* PSM.Change  
## \* Please inspect the loggedEvents

## Warning: Number of logged events: 3148

summary(tempdata)

## Class: mids  
## Number of multiple imputations: 5   
## Imputation methods:  
## ID Tx Age   
## "" "" ""   
## Sex Race Education   
## "" "" ""   
## MoCA MMSE SB\_Min.1   
## "pmm" "pmm" ""   
## SB\_Min.2 SB\_Min.3 SB\_Min.4   
## "pmm" "pmm" "pmm"   
## MVPA\_Min.1 MVPA\_Min.2 MVPA\_Min.3   
## "" "pmm" "pmm"   
## MVPA\_Min.4 WM.AgeCorrectedScore.1 PSM.AgeCorrectedScore.1   
## "pmm" "pmm" "pmm"   
## WM.AgeCorrectedScore.2 PSM.AgeCorrectedScore.2 WM.AgeCorrectedScore.3   
## "pmm" "pmm" "pmm"   
## PSM.AgeCorrectedScore.3 WM.AgeCorrectedScore.4 PSM.AgeCorrectedScore.4   
## "pmm" "pmm" "pmm"   
## SB.Changes1 SB.Changes2 SB.Changes   
## "pmm" "pmm" "pmm"   
## MVPA.Changes1 MVPA.Changes2 MVPA.Changes   
## "pmm" "pmm" "pmm"   
## List.Sorting.Change1 List.Sorting.Change2 List.Sorting.Change   
## "" "pmm" "pmm"   
## PSM.Change1 PSM.Change2 PSM.Change   
## "pmm" "pmm" "pmm"   
## txr   
## ""   
## PredictorMatrix:  
## ID Tx Age Sex Race Education MoCA MMSE SB\_Min.1 SB\_Min.2  
## ID 0 0 1 0 0 0 1 1 1 1  
## Tx 0 0 1 0 0 0 1 1 1 1  
## Age 0 0 0 0 0 0 1 1 1 1  
## Sex 0 0 1 0 0 0 1 1 1 1  
## Race 0 0 1 0 0 0 1 1 1 1  
## Education 0 0 1 0 0 0 1 1 1 1  
## SB\_Min.3 SB\_Min.4 MVPA\_Min.1 MVPA\_Min.2 MVPA\_Min.3 MVPA\_Min.4  
## ID 1 1 1 1 1 1  
## Tx 1 1 1 1 1 1  
## Age 1 1 1 1 1 1  
## Sex 1 1 1 1 1 1  
## Race 1 1 1 1 1 1  
## Education 1 1 1 1 1 1  
## WM.AgeCorrectedScore.1 PSM.AgeCorrectedScore.1  
## ID 1 1  
## Tx 1 1  
## Age 1 1  
## Sex 1 1  
## Race 1 1  
## Education 1 1  
## WM.AgeCorrectedScore.2 PSM.AgeCorrectedScore.2  
## ID 1 1  
## Tx 1 1  
## Age 1 1  
## Sex 1 1  
## Race 1 1  
## Education 1 1  
## WM.AgeCorrectedScore.3 PSM.AgeCorrectedScore.3  
## ID 1 1  
## Tx 1 1  
## Age 1 1  
## Sex 1 1  
## Race 1 1  
## Education 1 1  
## WM.AgeCorrectedScore.4 PSM.AgeCorrectedScore.4 SB.Changes1  
## ID 1 1 1  
## Tx 1 1 1  
## Age 1 1 1  
## Sex 1 1 1  
## Race 1 1 1  
## Education 1 1 1  
## SB.Changes2 SB.Changes MVPA.Changes1 MVPA.Changes2 MVPA.Changes  
## ID 1 1 1 1 1  
## Tx 1 1 1 1 1  
## Age 1 1 1 1 1  
## Sex 1 1 1 1 1  
## Race 1 1 1 1 1  
## Education 1 1 1 1 1  
## List.Sorting.Change1 List.Sorting.Change2 List.Sorting.Change  
## ID 0 1 1  
## Tx 0 1 1  
## Age 0 1 1  
## Sex 0 1 1  
## Race 0 1 1  
## Education 0 1 1  
## PSM.Change1 PSM.Change2 PSM.Change txr  
## ID 1 1 1 1  
## Tx 1 1 1 1  
## Age 1 1 1 1  
## Sex 1 1 1 1  
## Race 1 1 1 1  
## Education 1 1 1 1  
## Number of logged events: 3148   
## it im dep meth out  
## 1 0 0 constant ID  
## 2 0 0 constant Tx  
## 3 0 0 constant Sex  
## 4 0 0 constant Race  
## 5 0 0 constant Education  
## 6 0 0 constant List.Sorting.Change1

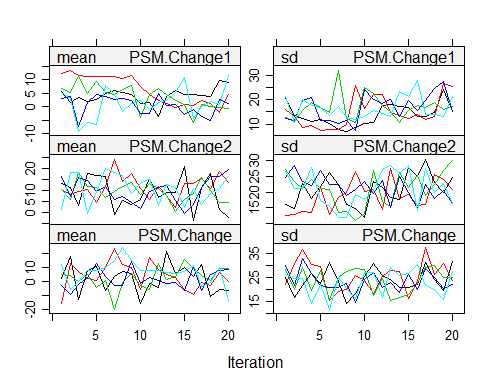
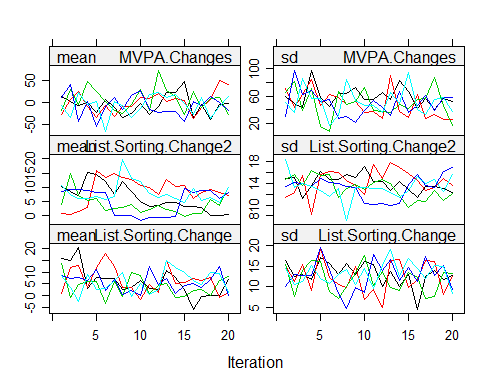
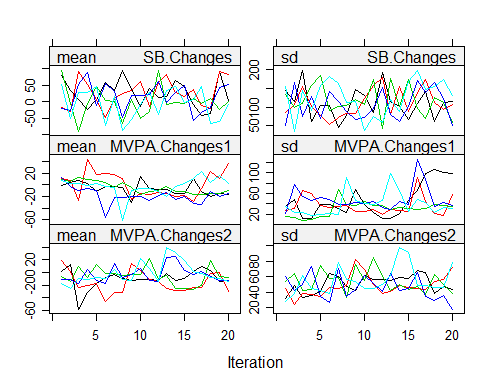
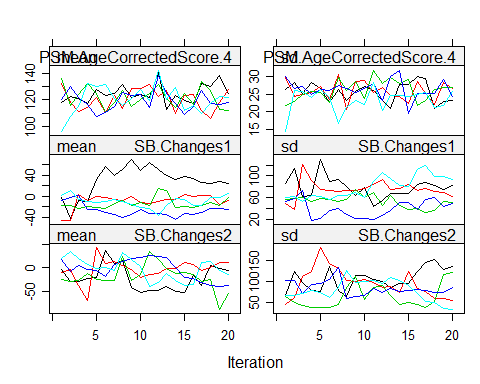
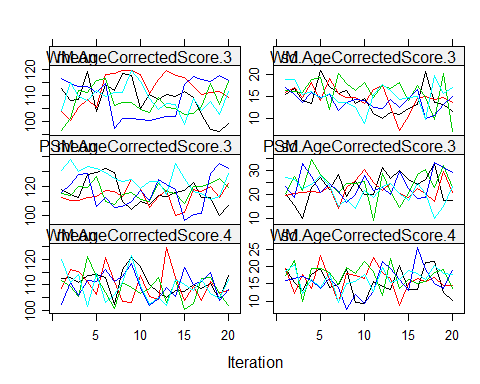
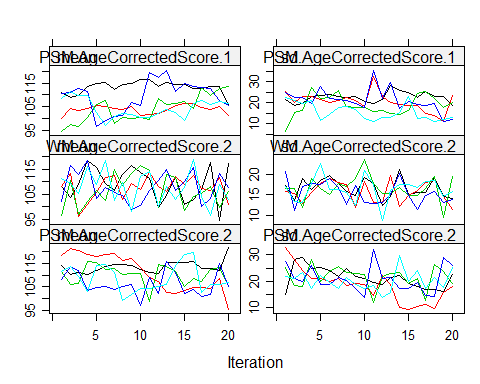
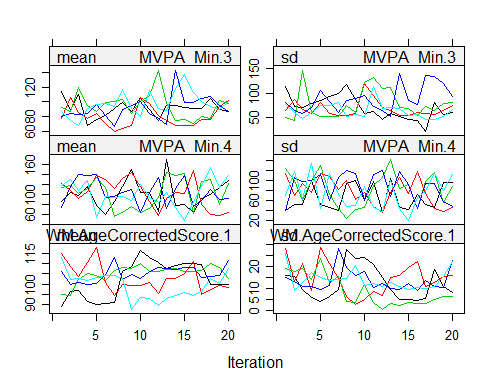
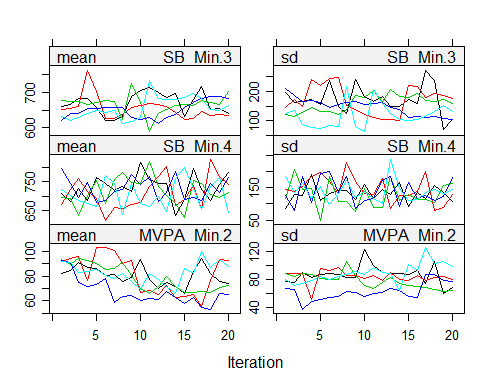
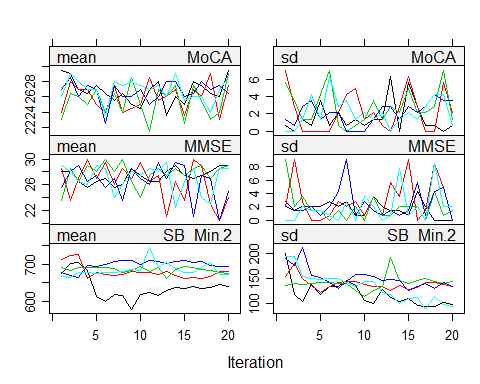
tempdata1 <- complete(tempdata, 1)   
tempdata2 <- complete(tempdata, 2)   
tempdata3 <- complete(tempdata, 3)   
tempdata4 <- complete(tempdata, 4)   
tempdata5 <- complete(tempdata, 5)   
  
##IMPUTATION CHECKS##  
#~~~~~~~~~~~~~~~~~~~~  
  
tempdata$imp$SB\_Min.3

## 1 2 3 4 5  
## 11 655.0000 556.1667 451.6667 601.0000 558.0000  
## 12 420.5000 582.0000 631.3333 639.1667 582.0000  
## 14 714.0000 764.0000 893.0000 847.2000 714.0000  
## 16 725.6667 826.5000 893.0000 760.8333 858.1667  
## 28 672.3333 851.1667 659.3333 748.0000 797.6667  
## 52 627.3333 420.5000 635.0000 631.3333 504.8000  
## 57 673.5000 451.6667 754.1667 558.0000 631.3333

tempdata$meth

## ID Tx Age   
## "" "" ""   
## Sex Race Education   
## "" "" ""   
## MoCA MMSE SB\_Min.1   
## "pmm" "pmm" ""   
## SB\_Min.2 SB\_Min.3 SB\_Min.4   
## "pmm" "pmm" "pmm"   
## MVPA\_Min.1 MVPA\_Min.2 MVPA\_Min.3   
## "" "pmm" "pmm"   
## MVPA\_Min.4 WM.AgeCorrectedScore.1 PSM.AgeCorrectedScore.1   
## "pmm" "pmm" "pmm"   
## WM.AgeCorrectedScore.2 PSM.AgeCorrectedScore.2 WM.AgeCorrectedScore.3   
## "pmm" "pmm" "pmm"   
## PSM.AgeCorrectedScore.3 WM.AgeCorrectedScore.4 PSM.AgeCorrectedScore.4   
## "pmm" "pmm" "pmm"   
## SB.Changes1 SB.Changes2 SB.Changes   
## "pmm" "pmm" "pmm"   
## MVPA.Changes1 MVPA.Changes2 MVPA.Changes   
## "pmm" "pmm" "pmm"   
## List.Sorting.Change1 List.Sorting.Change2 List.Sorting.Change   
## "" "pmm" "pmm"   
## PSM.Change1 PSM.Change2 PSM.Change   
## "pmm" "pmm" "pmm"   
## txr   
## ""

plot(tempdata)



##Working Memory ANCOVA Model using MI##  
#~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~#  
WM.ANCOVA.MI.delay <- with(tempdata, lm((WM.AgeCorrectedScore.2-WM.AgeCorrectedScore.1)~scale(WM.AgeCorrectedScore.1,center=TRUE,scale=FALSE) + Tx))  
summary(pool(WM.ANCOVA.MI.delay))

## estimate  
## (Intercept) 4.969009  
## scale(WM.AgeCorrectedScore.1, center = TRUE, scale = FALSE) -0.404900  
## TxImmediate -1.980252  
## std.error  
## (Intercept) 2.4964913  
## scale(WM.AgeCorrectedScore.1, center = TRUE, scale = FALSE) 0.1248508  
## TxImmediate 3.2531109  
## statistic  
## (Intercept) 1.9903971  
## scale(WM.AgeCorrectedScore.1, center = TRUE, scale = FALSE) -3.2430718  
## TxImmediate -0.6087255  
## df  
## (Intercept) 15.58587  
## scale(WM.AgeCorrectedScore.1, center = TRUE, scale = FALSE) 19.36700  
## TxImmediate 25.10766  
## p.value  
## (Intercept) 0.064382556  
## scale(WM.AgeCorrectedScore.1, center = TRUE, scale = FALSE) 0.004201496  
## TxImmediate 0.548174803

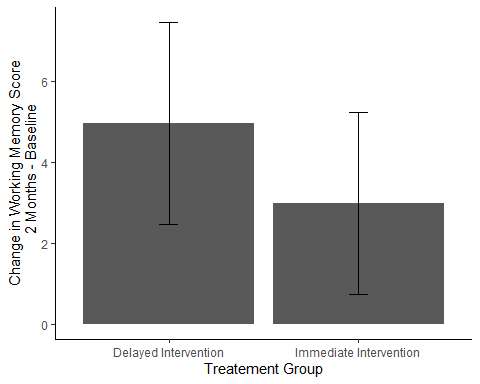
WM.ANCOVA.MI.immediate <- with(tempdata, lm((WM.AgeCorrectedScore.2-WM.AgeCorrectedScore.1)~scale(WM.AgeCorrectedScore.1,center=TRUE,scale=FALSE) + txr))  
summary(pool(WM.ANCOVA.MI.immediate))

## estimate  
## (Intercept) 2.988757  
## scale(WM.AgeCorrectedScore.1, center = TRUE, scale = FALSE) -0.404900  
## txrDelayed 1.980252  
## std.error  
## (Intercept) 2.2457746  
## scale(WM.AgeCorrectedScore.1, center = TRUE, scale = FALSE) 0.1248508  
## txrDelayed 3.2531109  
## statistic  
## (Intercept) 1.3308358  
## scale(WM.AgeCorrectedScore.1, center = TRUE, scale = FALSE) -3.2430718  
## txrDelayed 0.6087255  
## df  
## (Intercept) 30.42762  
## scale(WM.AgeCorrectedScore.1, center = TRUE, scale = FALSE) 19.36700  
## txrDelayed 25.10766  
## p.value  
## (Intercept) 0.193130332  
## scale(WM.AgeCorrectedScore.1, center = TRUE, scale = FALSE) 0.004201496  
## txrDelayed 0.548174803

WM.ANCOVA.MI <- with(tempdata, lm(WM.AgeCorrectedScore.2~WM.AgeCorrectedScore.1 + Tx))  
summary(pool(WM.ANCOVA.MI))

## estimate std.error statistic df  
## (Intercept) 46.406850 12.7751054 3.6326001 21.68643  
## WM.AgeCorrectedScore.1 0.595100 0.1248508 4.7664913 19.36700  
## TxImmediate -1.980252 3.2531109 -0.6087255 25.10766  
## p.value  
## (Intercept) 0.0014973446  
## WM.AgeCorrectedScore.1 0.0001278149  
## TxImmediate 0.5481748029

##Create Bar graph for Ancova model##  
WM.data.frame1 <- summary(pool(WM.ANCOVA.MI.delay))  
WMDF1<- data.frame(WM.data.frame1)  
  
WM.data.frame2 <- summary(pool(WM.ANCOVA.MI.immediate))  
WMDF2<- data.frame(WM.data.frame2)  
WMDF<- rbind(WMDF1, WMDF2)  
  
WMDF$t <- WMDF$df <- WMDF$Pr...t.. <- WMDF$lo.95 <- WMDF$hi.95 <- WMDF$nmis <- WMDF$fmi <- WMDF$lambda <- NULL   
  
  
WMDF3 <- WMDF[1,]  
WMDF4 <- WMDF[4,]  
WMDF.Final <- rbind(WMDF3, WMDF4)  
View(WMDF.Final)  
WMDF.Final$Treatment <- NA  
WMDF.Final$Treatment <- ifelse(WMDF.Final$est > 4,  
 c("Delayed Intervention"), c("Immediate Intervention"))   
  
ggplot(WMDF.Final, aes(x=Treatment, y=estimate)) + geom\_bar(stat = "identity", size= .3) +  
 geom\_errorbar(aes(ymin=estimate-std.error, ymax=estimate+std.error),  
 width=.1,   
 position=position\_dodge(.5)) +   
 xlab("Treatement Group") + ylab("Change in Working Memory Score  
 2 Months - Baseline") +  
 theme\_bw() + theme(panel.border = element\_blank(), panel.grid.major = element\_blank(),  
 panel.grid.minor = element\_blank(), axis.line = element\_line(colour = "black"))



##Picture Sequence Memory ANCOVA model using MI#  
##~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~##  
PSM.ANCOVA.MI.delay <- with(tempdata, lm((PSM.AgeCorrectedScore.2-PSM.AgeCorrectedScore.1)~scale(PSM.AgeCorrectedScore.1,center=TRUE,scale=FALSE) + Tx))  
summary(pool(PSM.ANCOVA.MI.delay))

## estimate  
## (Intercept) 4.5294090  
## scale(PSM.AgeCorrectedScore.1, center = TRUE, scale = FALSE) -0.4415127  
## TxImmediate -0.7685317  
## std.error  
## (Intercept) 3.8646572  
## scale(PSM.AgeCorrectedScore.1, center = TRUE, scale = FALSE) 0.1488928  
## TxImmediate 5.1306971  
## statistic  
## (Intercept) 1.1720080  
## scale(PSM.AgeCorrectedScore.1, center = TRUE, scale = FALSE) -2.9653067  
## TxImmediate -0.1497909  
## df  
## (Intercept) 13.80597  
## scale(PSM.AgeCorrectedScore.1, center = TRUE, scale = FALSE) 27.64165  
## TxImmediate 21.84132  
## p.value  
## (Intercept) 0.261022315  
## scale(PSM.AgeCorrectedScore.1, center = TRUE, scale = FALSE) 0.006166795  
## TxImmediate 0.882304212

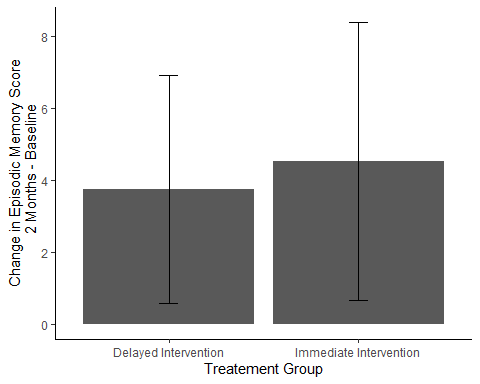
PSM.ANCOVA.MI.immediate <- with(tempdata, lm((PSM.AgeCorrectedScore.2-PSM.AgeCorrectedScore.1)~scale(PSM.AgeCorrectedScore.1,center=TRUE,scale=FALSE) + txr))  
summary(pool(PSM.ANCOVA.MI.immediate))

## estimate  
## (Intercept) 3.7608773  
## scale(PSM.AgeCorrectedScore.1, center = TRUE, scale = FALSE) -0.4415127  
## txrDelayed 0.7685317  
## std.error  
## (Intercept) 3.1703582  
## scale(PSM.AgeCorrectedScore.1, center = TRUE, scale = FALSE) 0.1488928  
## txrDelayed 5.1306971  
## statistic  
## (Intercept) 1.1862626  
## scale(PSM.AgeCorrectedScore.1, center = TRUE, scale = FALSE) -2.9653067  
## txrDelayed 0.1497909  
## df  
## (Intercept) 45.71696  
## scale(PSM.AgeCorrectedScore.1, center = TRUE, scale = FALSE) 27.64165  
## txrDelayed 21.84132  
## p.value  
## (Intercept) 0.241647167  
## scale(PSM.AgeCorrectedScore.1, center = TRUE, scale = FALSE) 0.006166795  
## txrDelayed 0.882304212

PSM.ANCOVA.MI <- with(tempdata, lm(PSM.AgeCorrectedScore.2~PSM.AgeCorrectedScore.1 + Tx))  
summary(pool(PSM.ANCOVA.MI))

## estimate std.error statistic df  
## (Intercept) 51.8356662 17.2350000 3.0075815 25.38075  
## PSM.AgeCorrectedScore.1 0.5584873 0.1488928 3.7509360 27.64165  
## TxImmediate -0.7685317 5.1306971 -0.1497909 21.84132  
## p.value  
## (Intercept) 0.0058699966  
## PSM.AgeCorrectedScore.1 0.0008285191  
## TxImmediate 0.8823042118

##Create Bar Graph for ANCOVA Models##  
PSM.data.frame1 <- summary(pool(PSM.ANCOVA.MI.delay))  
PSMDF1<- data.frame(PSM.data.frame1)  
  
PSM.data.frame2 <- summary(pool(PSM.ANCOVA.MI.immediate))  
PSMDF2<- data.frame(PSM.data.frame2)  
PSMDF<- rbind(PSMDF1, PSMDF2)  
View(PSMDF)  
  
PSMDF$t <- PSMDF$df <- PSMDF$Pr...t.. <- PSMDF$lo.95 <- PSMDF$hi.95 <- PSMDF$nmis <- PSMDF$fmi <- PSMDF$lambda <- NULL   
  
PSMDF3 <- PSMDF[1,]  
PSMDF4 <- PSMDF[4,]  
PSMDF.Final <- rbind(PSMDF3, PSMDF4)  
View(PSMDF.Final)  
PSMDF.Final$Treatment <- NA  
PSMDF.Final$Treatment <- ifelse(PSMDF.Final$est > 4.5,  
 c("Immediate Intervention"), c("Delayed Intervention"))   
  
ggplot(PSMDF.Final, aes(x=Treatment, y=estimate)) + geom\_bar(stat = "identity", size= .3) +  
 geom\_errorbar(aes(ymin=estimate-std.error, ymax=estimate+std.error),  
 width=.1,   
 position=position\_dodge(.5)) +   
 xlab("Treatement Group") + ylab("Change in Episodic Memory Score  
 2 Months - Baseline") +  
 theme\_bw() + theme(panel.border = element\_blank(), panel.grid.major = element\_blank(),  
 panel.grid.minor = element\_blank(), axis.line = element\_line(colour = "black"))



##Regression for changes in MVPA and changes in cognition  
##~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~  
  
##Do Improvements in MVPA predict changes in working memory  
List.MVPA<-with(tempdata, lm(List.Sorting.Change~MVPA.Changes + MVPA\_Min.1 + WM.AgeCorrectedScore.1 + Tx))  
List.MVPA.1<-with(tempdata, lm(List.Sorting.Change~MVPA\_Min.1 + WM.AgeCorrectedScore.1 + Tx))  
  
summary(pool(List.MVPA))

## estimate std.error statistic df  
## (Intercept) 31.22699350 10.05859143 3.1045096 32.42608  
## MVPA.Changes 0.01468547 0.03551904 0.4134534 30.61198  
## MVPA\_Min.1 -0.02017639 0.01622494 -1.2435417 44.37825  
## WM.AgeCorrectedScore.1 -0.23401317 0.09393466 -2.4912335 33.89288  
## TxImmediate -5.87219611 2.35217771 -2.4964934 47.01956  
## p.value  
## (Intercept) 0.003938442  
## MVPA.Changes 0.682156632  
## MVPA\_Min.1 0.220197537  
## WM.AgeCorrectedScore.1 0.017789067  
## TxImmediate 0.016104928

pool.r.squared(List.MVPA, adjusted = FALSE)

## est lo 95 hi 95 fmi  
## R^2 0.2172112 0.04633701 0.4345223 NaN

pool.r.squared(List.MVPA.1, adjusted = FALSE)

## est lo 95 hi 95 fmi  
## R^2 0.2117635 0.04427543 0.4271238 NaN

##Do Improvements in MVPA predict changes in episodic memory  
PSM.MVPA<-with( tempdata, lm(PSM.Change~MVPA.Changes + MVPA\_Min.1 + PSM.AgeCorrectedScore.1 + Tx))  
PSM.MVPA.1<-with( tempdata, lm(PSM.Change~MVPA\_Min.1 + PSM.AgeCorrectedScore.1 + Tx))  
summary(pool(PSM.MVPA))

## estimate std.error statistic df  
## (Intercept) 28.40488018 23.37676947 1.2150901 14.37527  
## MVPA.Changes 0.01110671 0.07013596 0.1583598 47.69463  
## MVPA\_Min.1 -0.01213557 0.03884004 -0.3124500 27.57039  
## PSM.AgeCorrectedScore.1 -0.19634903 0.19356547 -1.0143805 17.24672  
## TxImmediate -2.26645474 5.86323397 -0.3865537 31.21355  
## p.value  
## (Intercept) 0.2439128  
## MVPA.Changes 0.8748419  
## MVPA\_Min.1 0.7570496  
## PSM.AgeCorrectedScore.1 0.3244214  
## TxImmediate 0.7017094

pool.r.squared(PSM.MVPA, adjusted = FALSE)

## est lo 95 hi 95 fmi  
## R^2 0.03808219 0.01749983 0.2344309 NaN

pool.r.squared(PSM.MVPA.1, adjusted = FALSE)

## est lo 95 hi 95 fmi  
## R^2 0.03620485 0.02065846 0.2355793 NaN

##Do Improvements in SB predict changes in episodic memory  
PSM.SB<-with(tempdata, lm(PSM.Change~SB.Changes + SB\_Min.1 + PSM.AgeCorrectedScore.1 + Tx))  
PSM.SB.1<-with(tempdata, lm(PSM.Change~SB\_Min.1 + PSM.AgeCorrectedScore.1 + Tx))  
summary(pool(PSM.SB))

## estimate std.error statistic df  
## (Intercept) 28.088626000 26.99443377 1.04053399 19.63131  
## SB.Changes 0.012968055 0.03782739 0.34282181 21.93341  
## SB\_Min.1 -0.001172435 0.02145187 -0.05465422 22.66760  
## PSM.AgeCorrectedScore.1 -0.198243893 0.19646518 -1.00905356 15.64799  
## TxImmediate -2.084057699 5.80316155 -0.35912454 27.22214  
## p.value  
## (Intercept) 0.3107381  
## SB.Changes 0.7349964  
## SB\_Min.1 0.9568928  
## PSM.AgeCorrectedScore.1 0.3282984  
## TxImmediate 0.7222726

pool.r.squared(PSM.SB, adjusted = FALSE)

## est lo 95 hi 95 fmi  
## R^2 0.04428911 0.01574692 0.2531002 NaN

pool.r.squared(PSM.SB.1, adjusted = FALSE)

## est lo 95 hi 95 fmi  
## R^2 0.03753841 0.01663265 0.2297819 NaN

##Do Improvements in SB predict changes in list sorting  
List.Sort.SB<-with(tempdata, lm(List.Sorting.Change~SB.Changes + SB\_Min.1 + WM.AgeCorrectedScore.1 + Tx))  
List.Sort.SB.1<-with(tempdata, lm(List.Sorting.Change~SB\_Min.1 + WM.AgeCorrectedScore.1 + Tx))  
summary(pool(List.Sort.SB))

## estimate std.error statistic df  
## (Intercept) 22.824545040 11.415150898 1.9994957 36.02798  
## SB.Changes -0.015290734 0.016116428 -0.9487669 39.73454  
## SB\_Min.1 0.003032241 0.009081971 0.3338747 36.20044  
## WM.AgeCorrectedScore.1 -0.188154561 0.091549053 -2.0552322 37.88813  
## TxImmediate -5.403691398 2.249676557 -2.4019859 52.83871  
## p.value  
## (Intercept) 0.05313946  
## SB.Changes 0.34847426  
## SB\_Min.1 0.74040051  
## WM.AgeCorrectedScore.1 0.04679765  
## TxImmediate 0.01985469

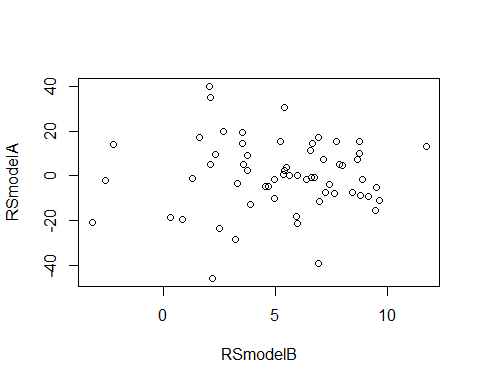
pool.r.squared(List.Sort.SB, adjusted = FALSE)

## est lo 95 hi 95 fmi  
## R^2 0.197504 0.04296446 0.3997053 NaN

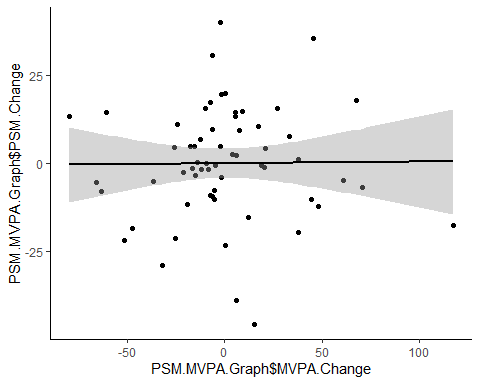
pool.r.squared(PSM.MVPA.1, adjusted = FALSE)

## est lo 95 hi 95 fmi  
## R^2 0.03620485 0.02065846 0.2355793 NaN

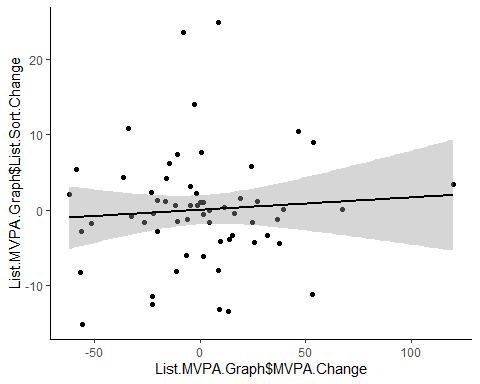
##PLOTTING RESIDUALS##  
  
##~~~~~~~~~~~~~~~~~~~~~~~~~~  
  
#List Sorting and MVPA#  
List.MVPA1<-lm(List.Sorting.Change~MVPA.Changes + MVPA\_Min.1 + WM.AgeCorrectedScore.1 + Tx, data= tempdata1)  
List.MVPA2<-lm(List.Sorting.Change~MVPA.Changes + MVPA\_Min.1 + WM.AgeCorrectedScore.1 + Tx, data= tempdata2)  
List.MVPA3<-lm(List.Sorting.Change~MVPA.Changes + MVPA\_Min.1 + WM.AgeCorrectedScore.1 + Tx, data= tempdata3)  
List.MVPA4<-lm(List.Sorting.Change~MVPA.Changes + MVPA\_Min.1 + WM.AgeCorrectedScore.1 + Tx, data= tempdata4)  
List.MVPA5<-lm(List.Sorting.Change~MVPA.Changes + MVPA\_Min.1 + WM.AgeCorrectedScore.1 + Tx, data= tempdata5)  
  
List.MVPA1A<-lm(List.Sorting.Change~ MVPA\_Min.1 + WM.AgeCorrectedScore.1 + Tx, data= tempdata1)  
List.MVPA2A<-lm(List.Sorting.Change~ MVPA\_Min.1 + WM.AgeCorrectedScore.1 + Tx, data= tempdata2)  
List.MVPA3A<-lm(List.Sorting.Change~ MVPA\_Min.1 + WM.AgeCorrectedScore.1 + Tx, data= tempdata3)  
List.MVPA4A<-lm(List.Sorting.Change~ MVPA\_Min.1 + WM.AgeCorrectedScore.1 + Tx, data= tempdata4)  
List.MVPA5A<-lm(List.Sorting.Change~ MVPA\_Min.1 + WM.AgeCorrectedScore.1 + Tx, data= tempdata5)  
  
List.MVPA1B<-lm(MVPA.Changes~ MVPA\_Min.1 + WM.AgeCorrectedScore.1 + Tx, data= tempdata1)  
List.MVPA2B<-lm(MVPA.Changes~ MVPA\_Min.1 + WM.AgeCorrectedScore.1 + Tx, data= tempdata2)  
List.MVPA3B<-lm(MVPA.Changes~ MVPA\_Min.1 + WM.AgeCorrectedScore.1 + Tx, data= tempdata3)  
List.MVPA4B<-lm(MVPA.Changes~ MVPA\_Min.1 + WM.AgeCorrectedScore.1 + Tx, data= tempdata4)  
List.MVPA5B<-lm(MVPA.Changes~ MVPA\_Min.1 + WM.AgeCorrectedScore.1 + Tx, data= tempdata5)  
  
  
  
  
#PSM and MVPA#  
PSM.MVPA1<-lm(PSM.Change~MVPA.Changes + MVPA\_Min.1 + PSM.AgeCorrectedScore.1 + Tx, data= tempdata1)  
PSM.MVPA2<-lm(PSM.Change~MVPA.Changes + MVPA\_Min.1 + PSM.AgeCorrectedScore.1 + Tx, data= tempdata2)  
PSM.MVPA3<-lm(PSM.Change~MVPA.Changes + MVPA\_Min.1 + PSM.AgeCorrectedScore.1 + Tx, data= tempdata3)  
PSM.MVPA4<-lm(PSM.Change~MVPA.Changes + MVPA\_Min.1 + PSM.AgeCorrectedScore.1 + Tx, data= tempdata4)  
PSM.MVPA5<-lm(PSM.Change~MVPA.Changes + MVPA\_Min.1 + PSM.AgeCorrectedScore.1 + Tx, data= tempdata5)  
  
PSM.MVPA1A<-lm(PSM.Change~MVPA\_Min.1 + PSM.AgeCorrectedScore.1 + Tx, data= tempdata1)  
PSM.MVPA2A<-lm(PSM.Change~MVPA\_Min.1 + PSM.AgeCorrectedScore.1 + Tx, data= tempdata2)  
PSM.MVPA3A<-lm(PSM.Change~MVPA\_Min.1 + PSM.AgeCorrectedScore.1 + Tx, data= tempdata3)  
PSM.MVPA4A<-lm(PSM.Change~MVPA\_Min.1 + PSM.AgeCorrectedScore.1 + Tx, data= tempdata4)  
PSM.MVPA5A<-lm(PSM.Change~MVPA\_Min.1 + PSM.AgeCorrectedScore.1 + Tx, data= tempdata5)  
  
PSM.MVPA1B<-lm(MVPA.Changes~MVPA\_Min.1 + PSM.AgeCorrectedScore.1 + Tx, data= tempdata1)  
PSM.MVPA2B<-lm(MVPA.Changes~MVPA\_Min.1 + PSM.AgeCorrectedScore.1 + Tx, data= tempdata2)  
PSM.MVPA3B<-lm(MVPA.Changes~MVPA\_Min.1 + PSM.AgeCorrectedScore.1 + Tx, data= tempdata3)  
PSM.MVPA4B<-lm(MVPA.Changes~MVPA\_Min.1 + PSM.AgeCorrectedScore.1 + Tx, data= tempdata4)  
PSM.MVPA5B<-lm(MVPA.Changes~MVPA\_Min.1 + PSM.AgeCorrectedScore.1 + Tx, data= tempdata5)  
  
  
#List Sorting and SB#  
List.SB1<-lm(List.Sorting.Change~SB.Changes + SB\_Min.1 + WM.AgeCorrectedScore.1 + Tx, data= tempdata1)  
List.SB2<-lm(List.Sorting.Change~SB.Changes + SB\_Min.1 + WM.AgeCorrectedScore.1 + Tx, data= tempdata2)  
List.SB3<-lm(List.Sorting.Change~SB.Changes + SB\_Min.1 + WM.AgeCorrectedScore.1 + Tx, data= tempdata3)  
List.SB4<-lm(List.Sorting.Change~SB.Changes + SB\_Min.1 + WM.AgeCorrectedScore.1 + Tx, data= tempdata4)  
List.SB5<-lm(List.Sorting.Change~SB.Changes + SB\_Min.1 + WM.AgeCorrectedScore.1 + Tx, data= tempdata5)  
  
List.SB1A<-lm(List.Sorting.Change~ SB\_Min.1 + WM.AgeCorrectedScore.1 + Tx, data= tempdata1)  
List.SB2A<-lm(List.Sorting.Change~ SB\_Min.1 + WM.AgeCorrectedScore.1 + Tx, data= tempdata2)  
List.SB3A<-lm(List.Sorting.Change~ SB\_Min.1 + WM.AgeCorrectedScore.1 + Tx, data= tempdata3)  
List.SB4A<-lm(List.Sorting.Change~ SB\_Min.1 + WM.AgeCorrectedScore.1 + Tx, data= tempdata4)  
List.SB5A<-lm(List.Sorting.Change~ SB\_Min.1 + WM.AgeCorrectedScore.1 + Tx, data= tempdata5)  
  
List.SB1B<-lm(SB.Changes~ SB\_Min.1 + WM.AgeCorrectedScore.1 + Tx, data= tempdata1)  
List.SB2B<-lm(SB.Changes~ SB\_Min.1 + WM.AgeCorrectedScore.1 + Tx, data= tempdata2)  
List.SB3B<-lm(SB.Changes~ SB\_Min.1 + WM.AgeCorrectedScore.1 + Tx, data= tempdata3)  
List.SB4B<-lm(SB.Changes~ SB\_Min.1 + WM.AgeCorrectedScore.1 + Tx, data= tempdata4)  
List.SB5B<-lm(SB.Changes~ SB\_Min.1 + WM.AgeCorrectedScore.1 + Tx, data= tempdata5)  
  
  
  
  
#PSM and MVPA#  
PSM.SB1<-lm(PSM.Change~SB.Changes + SB\_Min.1 + PSM.AgeCorrectedScore.1 + Tx, data= tempdata1)  
PSM.SB2<-lm(PSM.Change~SB.Changes + SB\_Min.1 + PSM.AgeCorrectedScore.1 + Tx, data= tempdata2)  
PSM.SB3<-lm(PSM.Change~SB.Changes + SB\_Min.1 + PSM.AgeCorrectedScore.1 + Tx, data= tempdata3)  
PSM.SB4<-lm(PSM.Change~SB.Changes + SB\_Min.1 + PSM.AgeCorrectedScore.1 + Tx, data= tempdata4)  
PSM.SB5<-lm(PSM.Change~SB.Changes + SB\_Min.1 + PSM.AgeCorrectedScore.1 + Tx, data= tempdata5)  
  
PSM.SB1A<-lm(PSM.Change~SB\_Min.1 + PSM.AgeCorrectedScore.1 + Tx, data= tempdata1)  
PSM.SB2A<-lm(PSM.Change~SB\_Min.1 + PSM.AgeCorrectedScore.1 + Tx, data= tempdata2)  
PSM.SB3A<-lm(PSM.Change~SB\_Min.1 + PSM.AgeCorrectedScore.1 + Tx, data= tempdata3)  
PSM.SB4A<-lm(PSM.Change~SB\_Min.1 + PSM.AgeCorrectedScore.1 + Tx, data= tempdata4)  
PSM.SB5A<-lm(PSM.Change~SB\_Min.1 + PSM.AgeCorrectedScore.1 + Tx, data= tempdata5)  
  
PSM.SB1B<-lm(SB.Changes~SB\_Min.1 + PSM.AgeCorrectedScore.1 + Tx, data= tempdata1)  
PSM.SB2B<-lm(SB.Changes~SB\_Min.1 + PSM.AgeCorrectedScore.1 + Tx, data= tempdata2)  
PSM.SB3B<-lm(SB.Changes~SB\_Min.1 + PSM.AgeCorrectedScore.1 + Tx, data= tempdata3)  
PSM.SB4B<-lm(SB.Changes~SB\_Min.1 + PSM.AgeCorrectedScore.1 + Tx, data= tempdata4)  
PSM.SB5B<-lm(SB.Changes~SB\_Min.1 + PSM.AgeCorrectedScore.1 + Tx, data= tempdata5)  
  
  
  
  
  
##QQ PLOTS Pooled Data##  
Residuals.PSM.MVPA.1 <-residuals(PSM.MVPA1)+residuals(PSM.MVPA2)+residuals(PSM.MVPA3)+residuals(PSM.MVPA4)+residuals(PSM.MVPA5)  
RSmodelA <- Residuals.PSM.MVPA.1 / 5  
  
Predicted.PSM.MVPA.2 <-predict(PSM.MVPA1)+predict(PSM.MVPA2)+predict(PSM.MVPA3)+predict(PSM.MVPA4)+predict(PSM.MVPA5)  
RSmodelB <- Predicted.PSM.MVPA.2 / 5  
  
plot (RSmodelB, RSmodelA)



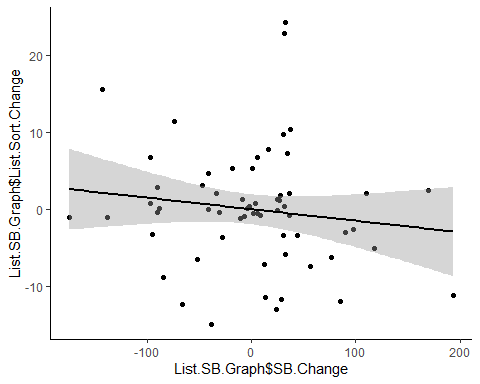
# Computing and saving the mean residual per individual over 5 imputed datasets for PSM and MVPA  
Residuals.PSM.MVPA.1 <-residuals(PSM.MVPA1A)+residuals(PSM.MVPA2A)+residuals(PSM.MVPA3A)+residuals(PSM.MVPA4A)+residuals(PSM.MVPA5A)  
RSmodel1 <- Residuals.PSM.MVPA.1 / 5  
  
Residuals.PSM.MVPA.2 <-residuals(PSM.MVPA1B)+residuals(PSM.MVPA2B)+residuals(PSM.MVPA3B)+residuals(PSM.MVPA4B)+residuals(PSM.MVPA5B)  
RSmodel2 <- Residuals.PSM.MVPA.2 / 5  
  
  
PSM.MVPA.Residuals <- list(RSmodel1, RSmodel2)  
  
PSM.MVPA.Residuals.2 <- do.call(cbind, lapply(lapply(PSM.MVPA.Residuals, unlist), "[",  
 unique(unlist(c(sapply(PSM.MVPA.Residuals,names))))))  
colnames(PSM.MVPA.Residuals.2) <- c("PSM.Change", "MVPA.Change")  
  
PSM.MVPA.Graph <- data.frame(PSM.MVPA.Residuals.2)  
  
  
ggplot(data = PSM.MVPA.Graph, aes(x = PSM.MVPA.Graph$MVPA.Change, y = PSM.MVPA.Graph$PSM.Change)) +   
 geom\_point(color='black') + geom\_smooth(method= 'lm', se = TRUE, color= 'black') +  
 theme\_bw() + theme(panel.border = element\_blank(), panel.grid.major = element\_blank(),  
 panel.grid.minor = element\_blank(), axis.line = element\_line(colour = "black"))



# Computing and saving the mean residual per individual over 5 imputed datasets for List Sorting and MVPA  
Residuals.List.MVPA.1 <-residuals(List.MVPA1A)+residuals(List.MVPA2A)+residuals(List.MVPA3A)+residuals(List.MVPA4A)+residuals(List.MVPA5A)  
RSmodel3 <- Residuals.List.MVPA.1 / 5  
  
Residuals.List.MVPA.2 <-residuals(List.MVPA1B)+residuals(List.MVPA2B)+residuals(List.MVPA3B)+residuals(List.MVPA4B)+residuals(List.MVPA5B)  
RSmodel4 <- Residuals.List.MVPA.2 / 5  
  
  
List.MVPA.Residuals <- list(RSmodel3, RSmodel4)  
  
List.MVPA.Residuals.2 <- do.call(cbind, lapply(lapply(List.MVPA.Residuals, unlist), "[",  
 unique(unlist(c(sapply(List.MVPA.Residuals,names))))))  
colnames(List.MVPA.Residuals.2) <- c("List.Sort.Change", "MVPA.Change")  
  
List.MVPA.Graph <- data.frame(List.MVPA.Residuals.2)  
  
  
ggplot(data = List.MVPA.Graph, aes(x = List.MVPA.Graph$MVPA.Change, y = List.MVPA.Graph$List.Sort.Change)) +   
 geom\_point(color='black') + geom\_smooth(method= 'lm', se = TRUE, color= 'black') +  
 theme\_bw() + theme(panel.border = element\_blank(), panel.grid.major = element\_blank(),  
 panel.grid.minor = element\_blank(), axis.line = element\_line(colour = "black"))



# Computing and saving the mean residual per individual over 5 imputed datasets for List Sorting and SB  
Residuals.List.SB.1 <-residuals(List.SB1A)+residuals(List.SB2A)+residuals(List.SB3A)+residuals(List.SB4A)+residuals(List.SB5A)  
RSmodel5 <- Residuals.List.SB.1 / 5  
  
Residuals.List.SB.2 <-residuals(List.SB1B)+residuals(List.SB2B)+residuals(List.SB3B)+residuals(List.SB4B)+residuals(List.SB5B)  
RSmodel6 <- Residuals.List.SB.2 / 5  
  
  
List.SB.Residuals <- list(RSmodel5, RSmodel6)  
  
List.SB.Residuals.2 <- do.call(cbind, lapply(lapply(List.SB.Residuals, unlist), "[",  
 unique(unlist(c(sapply(List.SB.Residuals,names))))))  
colnames(List.SB.Residuals.2) <- c("List.Sort.Change", "SB.Change")  
  
List.SB.Graph <- data.frame(List.SB.Residuals.2)  
  
  
ggplot(data = List.SB.Graph, aes(x = List.SB.Graph$SB.Change, y = List.SB.Graph$List.Sort.Change)) +   
 geom\_point(color='black') + geom\_smooth(method= 'lm', se = TRUE, color= 'black') +  
 theme\_bw() + theme(panel.border = element\_blank(), panel.grid.major = element\_blank(),  
 panel.grid.minor = element\_blank(), axis.line = element\_line(colour = "black"))



# Computing and saving the mean residual per individual over 5 imputed datasets for Picture Sequence Memory and SB  
Residuals.PSM.SB.1 <-residuals(PSM.SB1A)+residuals(PSM.SB2A)+residuals(PSM.SB3A)+residuals(PSM.SB4A)+residuals(PSM.SB5A)  
RSmodel7 <- Residuals.PSM.SB.1 / 5  
  
Residuals.PSM.SB.2 <-residuals(PSM.SB1B)+residuals(PSM.SB2B)+residuals(PSM.SB3B)+residuals(PSM.SB4B)+residuals(PSM.SB5B)  
RSmodel8 <- Residuals.PSM.SB.2 / 5  
  
  
PSM.SB.Residuals <- list(RSmodel7, RSmodel8)  
  
PSM.SB.Residuals.2 <- do.call(cbind, lapply(lapply(PSM.SB.Residuals, unlist), "[",  
 unique(unlist(c(sapply(PSM.SB.Residuals,names))))))  
colnames(PSM.SB.Residuals.2) <- c("PSM.Change", "SB.Change")  
  
PSM.SB.Graph <- data.frame(PSM.SB.Residuals.2)  
  
ggplot(data = PSM.SB.Graph, aes(x = PSM.SB.Graph$SB.Change, y = PSM.SB.Graph$PSM.Change)) +   
 geom\_point(color='black') + geom\_smooth(method= 'lm', se = TRUE, color= 'black') +  
 theme\_bw() + theme(panel.border = element\_blank(), panel.grid.major = element\_blank(),  
 panel.grid.minor = element\_blank(), axis.line = element\_line(colour = "black"))

