Spearman–Brown Split-Half Reliability

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# Note: Analyses without outliers identified and removed

# Load packages  
library(splithalfr)  
library(stats)

# Turn off scientific notation  
options(scipen = 999)

# 1 Minute  
# Without Outliers Removed  
  
# Read data  
data <- read.csv("trans\_60s\_split\_norm.csv")  
  
spearman\_brown(data$even\_60s\_norm\_FromA\_ToB, data$odd\_60s\_norm\_FromA\_ToB) # No out

## [1] 0.3025912

spearman\_brown(data$even\_60s\_norm\_FromA\_ToC, data$odd\_60s\_norm\_FromA\_ToC) # 2 out

## [1] 0.2674716

spearman\_brown(data$even\_60s\_norm\_FromA\_ToD, data$odd\_60s\_norm\_FromA\_ToD) # No out

## [1] 0.385176

spearman\_brown(data$even\_60s\_norm\_FromA\_ToF, data$odd\_60s\_norm\_FromA\_ToF) # No out

## [1] -0.519095

spearman\_brown(data$even\_60s\_norm\_FromB\_ToA, data$odd\_60s\_norm\_FromB\_ToA) # No out

## [1] 0.2234728

spearman\_brown(data$even\_60s\_norm\_FromB\_ToC, data$odd\_60s\_norm\_FromB\_ToC) # 2 out

## [1] -0.1412785

spearman\_brown(data$even\_60s\_norm\_FromB\_ToD, data$odd\_60s\_norm\_FromB\_ToD) # No out

## [1] -0.130796

spearman\_brown(data$even\_60s\_norm\_FromB\_ToF, data$odd\_60s\_norm\_FromB\_ToF) # 3 out

## [1] 0.2600419

spearman\_brown(data$even\_60s\_norm\_FromC\_ToA, data$odd\_60s\_norm\_FromC\_ToA) # No out

## [1] 0.2870866

spearman\_brown(data$even\_60s\_norm\_FromC\_ToB, data$odd\_60s\_norm\_FromC\_ToB) # No out

## [1] 0.2216633

spearman\_brown(data$even\_60s\_norm\_FromC\_ToD, data$odd\_60s\_norm\_FromC\_ToD) # No out

## [1] 0.3039721

spearman\_brown(data$even\_60s\_norm\_FromC\_ToF, data$odd\_60s\_norm\_FromC\_ToF) # 2 out

## [1] -0.2745882

spearman\_brown(data$even\_60s\_norm\_FromD\_ToA, data$odd\_60s\_norm\_FromD\_ToA) # No out

## [1] -0.1739355

spearman\_brown(data$even\_60s\_norm\_FromD\_ToB, data$odd\_60s\_norm\_FromD\_ToB) # 1 out

## [1] 0.01932167

spearman\_brown(data$even\_60s\_norm\_FromD\_ToC, data$odd\_60s\_norm\_FromD\_ToC) # No out

## [1] -0.04865067

spearman\_brown(data$even\_60s\_norm\_FromD\_ToF, data$odd\_60s\_norm\_FromD\_ToF) # No out

## [1] -0.9075992

spearman\_brown(data$even\_60s\_norm\_FromF\_ToA, data$odd\_60s\_norm\_FromF\_ToA) # 1 out

## [1] -0.5362368

spearman\_brown(data$even\_60s\_norm\_FromF\_ToB, data$odd\_60s\_norm\_FromF\_ToB) # No out

## [1] 0.01624262

spearman\_brown(data$even\_60s\_norm\_FromF\_ToC, data$odd\_60s\_norm\_FromF\_ToC) # No out

## [1] 0.1556637

spearman\_brown(data$even\_60s\_norm\_FromF\_ToD, data$odd\_60s\_norm\_FromF\_ToD) # 3 out

## [1] 0.019205

# Determine outliers  
  
data <- read.csv("trans\_60s\_split\_norm.csv")  
  
# Create subset of data   
data\_subset <- subset(data, select = c(even\_60s\_norm\_FromA\_ToC, odd\_60s\_norm\_FromA\_ToC))  
  
# Minimum Covariance Determinant  
output75 <- cov.mcd(data\_subset, quantile.used = nrow(data\_subset)\*.75)  
mhmcd75 <- mahalanobis(data\_subset, output75$center, output75$cov)  
alpha <- .001  
cutoff <- (qchisq(p = 1 - alpha, df = ncol(data\_subset)))  
names\_outlier\_MCD75 <- which(mhmcd75 > cutoff)  
data\_reduced <- data[-c(names\_outlier\_MCD75), ] # Remove outliers  
  
spearman\_brown(data\_reduced$even\_60s\_norm\_FromA\_ToC, data\_reduced$odd\_60s\_norm\_FromA\_ToC)

## [1] 0.3752411

48-nrow(data\_reduced)

## [1] 2

# Determine outliers  
  
data <- read.csv("trans\_60s\_split\_norm.csv")  
  
# Create subset of data   
data\_subset <- subset(data, select = c(even\_60s\_norm\_FromB\_ToC, odd\_60s\_norm\_FromB\_ToC))  
  
# Minimum Covariance Determinant  
output75 <- cov.mcd(data\_subset, quantile.used = nrow(data\_subset)\*.75)  
mhmcd75 <- mahalanobis(data\_subset, output75$center, output75$cov)  
alpha <- .001  
cutoff <- (qchisq(p = 1 - alpha, df = ncol(data\_subset)))  
names\_outlier\_MCD75 <- which(mhmcd75 > cutoff)  
data\_reduced <- data[-c(names\_outlier\_MCD75), ] # Remove outliers  
  
spearman\_brown(data\_reduced$even\_60s\_norm\_FromB\_ToC, data\_reduced$odd\_60s\_norm\_FromB\_ToC)

## [1] -0.6830153

48-nrow(data\_reduced)

## [1] 2

# Determine outliers  
  
data <- read.csv("trans\_60s\_split\_norm.csv")  
  
# Create subset of data   
data\_subset <- subset(data, select = c(even\_60s\_norm\_FromB\_ToF, odd\_60s\_norm\_FromB\_ToF))  
  
# Minimum Covariance Determinant  
output75 <- cov.mcd(data\_subset, quantile.used = nrow(data\_subset)\*.75)  
mhmcd75 <- mahalanobis(data\_subset, output75$center, output75$cov)  
alpha <- .001  
cutoff <- (qchisq(p = 1 - alpha, df = ncol(data\_subset)))  
names\_outlier\_MCD75 <- which(mhmcd75 > cutoff)  
data\_reduced <- data[-c(names\_outlier\_MCD75), ] # Remove outliers  
  
spearman\_brown(data\_reduced$even\_60s\_norm\_FromB\_ToF, data\_reduced$odd\_60s\_norm\_FromB\_ToF)

## [1] 0.6786014

48-nrow(data\_reduced)

## [1] 3

# Determine outliers  
  
data <- read.csv("trans\_60s\_split\_norm.csv")  
  
# Create subset of data   
data\_subset <- subset(data, select = c(even\_60s\_norm\_FromC\_ToF, odd\_60s\_norm\_FromC\_ToF))  
  
# Minimum Covariance Determinant  
output75 <- cov.mcd(data\_subset, quantile.used = nrow(data\_subset)\*.75)  
mhmcd75 <- mahalanobis(data\_subset, output75$center, output75$cov)  
alpha <- .001  
cutoff <- (qchisq(p = 1 - alpha, df = ncol(data\_subset)))  
names\_outlier\_MCD75 <- which(mhmcd75 > cutoff)  
data\_reduced <- data[-c(names\_outlier\_MCD75), ] # Remove outliers  
  
spearman\_brown(data\_reduced$even\_60s\_norm\_FromC\_ToF, data\_reduced$odd\_60s\_norm\_FromC\_ToF)

## [1] 0.07926953

48-nrow(data\_reduced)

## [1] 2

# Determine outliers  
  
data <- read.csv("trans\_60s\_split\_norm.csv")  
  
# Create subset of data   
data\_subset <- subset(data, select = c(even\_60s\_norm\_FromD\_ToB, odd\_60s\_norm\_FromD\_ToB))  
  
# Minimum Covariance Determinant  
output75 <- cov.mcd(data\_subset, quantile.used = nrow(data\_subset)\*.75)  
mhmcd75 <- mahalanobis(data\_subset, output75$center, output75$cov)  
alpha <- .001  
cutoff <- (qchisq(p = 1 - alpha, df = ncol(data\_subset)))  
names\_outlier\_MCD75 <- which(mhmcd75 > cutoff)  
data\_reduced <- data[-c(names\_outlier\_MCD75), ] # Remove outliers  
  
spearman\_brown(data\_reduced$even\_60s\_norm\_FromD\_ToB, data\_reduced$odd\_60s\_norm\_FromD\_ToB)

## [1] -0.2309355

48-nrow(data\_reduced)

## [1] 1

# Determine outliers  
  
data <- read.csv("trans\_60s\_split\_norm.csv")  
  
# Create subset of data   
data\_subset <- subset(data, select = c(even\_60s\_norm\_FromF\_ToA, odd\_60s\_norm\_FromF\_ToA))  
  
# Minimum Covariance Determinant  
output75 <- cov.mcd(data\_subset, quantile.used = nrow(data\_subset)\*.75)  
mhmcd75 <- mahalanobis(data\_subset, output75$center, output75$cov)  
alpha <- .001  
cutoff <- (qchisq(p = 1 - alpha, df = ncol(data\_subset)))  
names\_outlier\_MCD75 <- which(mhmcd75 > cutoff)  
data\_reduced <- data[-c(names\_outlier\_MCD75), ] # Remove outliers  
  
spearman\_brown(data\_reduced$even\_60s\_norm\_FromF\_ToA, data\_reduced$odd\_60s\_norm\_FromF\_ToA)

## [1] -0.3615807

48-nrow(data\_reduced)

## [1] 1

# Determine outliers  
  
data <- read.csv("trans\_60s\_split\_norm.csv")  
  
# Create subset of data   
data\_subset <- subset(data, select = c(even\_60s\_norm\_FromF\_ToD, odd\_60s\_norm\_FromF\_ToD))  
  
# Minimum Covariance Determinant  
output75 <- cov.mcd(data\_subset, quantile.used = nrow(data\_subset)\*.75)  
mhmcd75 <- mahalanobis(data\_subset, output75$center, output75$cov)  
alpha <- .001  
cutoff <- (qchisq(p = 1 - alpha, df = ncol(data\_subset)))  
names\_outlier\_MCD75 <- which(mhmcd75 > cutoff)  
data\_reduced <- data[-c(names\_outlier\_MCD75), ] # Remove outliers  
  
spearman\_brown(data\_reduced$even\_60s\_norm\_FromF\_ToD, data\_reduced$odd\_60s\_norm\_FromF\_ToD)

## [1] 0.3390206

48-nrow(data\_reduced)

## [1] 3

# 2 Minutes  
# Without Outliers Removed  
  
# Read data  
data <- read.csv("trans\_120s\_split\_norm.csv")  
  
spearman\_brown(data$even\_120s\_norm\_FromA\_ToB, data$odd\_120s\_norm\_FromA\_ToB) # No out

## [1] 0.1428587

spearman\_brown(data$even\_120s\_norm\_FromA\_ToC, data$odd\_120s\_norm\_FromA\_ToC) # No out

## [1] -0.2343749

spearman\_brown(data$even\_120s\_norm\_FromA\_ToD, data$odd\_120s\_norm\_FromA\_ToD) # No out

## [1] -0.1448411

spearman\_brown(data$even\_120s\_norm\_FromA\_ToF, data$odd\_120s\_norm\_FromA\_ToF) # 1 out

## [1] 0.09925354

spearman\_brown(data$even\_120s\_norm\_FromB\_ToA, data$odd\_120s\_norm\_FromB\_ToA) # 3 out

## [1] -0.02216519

spearman\_brown(data$even\_120s\_norm\_FromB\_ToC, data$odd\_120s\_norm\_FromB\_ToC) # No out

## [1] 0.1563305

spearman\_brown(data$even\_120s\_norm\_FromB\_ToD, data$odd\_120s\_norm\_FromB\_ToD) # No out

## [1] 0.1446987

spearman\_brown(data$even\_120s\_norm\_FromB\_ToF, data$odd\_120s\_norm\_FromB\_ToF) # No out

## [1] 0.1423506

spearman\_brown(data$even\_120s\_norm\_FromC\_ToA, data$odd\_120s\_norm\_FromC\_ToA) # No out

## [1] 0.495216

spearman\_brown(data$even\_120s\_norm\_FromC\_ToB, data$odd\_120s\_norm\_FromC\_ToB) # 1 out

## [1] 0.4099304

spearman\_brown(data$even\_120s\_norm\_FromC\_ToD, data$odd\_120s\_norm\_FromC\_ToD) # No out

## [1] 0.3661561

spearman\_brown(data$even\_120s\_norm\_FromC\_ToF, data$odd\_120s\_norm\_FromC\_ToF) # No out

## [1] 0.2470694

spearman\_brown(data$even\_120s\_norm\_FromD\_ToA, data$odd\_120s\_norm\_FromD\_ToA) # 1 out

## [1] 0.1450072

spearman\_brown(data$even\_120s\_norm\_FromD\_ToB, data$odd\_120s\_norm\_FromD\_ToB) # No out

## [1] 0.255789

spearman\_brown(data$even\_120s\_norm\_FromD\_ToC, data$odd\_120s\_norm\_FromD\_ToC) # No out

## [1] -0.1026693

spearman\_brown(data$even\_120s\_norm\_FromD\_ToF, data$odd\_120s\_norm\_FromD\_ToF) # 1 out

## [1] 0.07505201

spearman\_brown(data$even\_120s\_norm\_FromF\_ToA, data$odd\_120s\_norm\_FromF\_ToA) # No out

## [1] 0.1031087

spearman\_brown(data$even\_120s\_norm\_FromF\_ToB, data$odd\_120s\_norm\_FromF\_ToB) # No out

## [1] 0.2146954

spearman\_brown(data$even\_120s\_norm\_FromF\_ToC, data$odd\_120s\_norm\_FromF\_ToC) # 1 out

## [1] 0.1191105

spearman\_brown(data$even\_120s\_norm\_FromF\_ToD, data$odd\_120s\_norm\_FromF\_ToD) # 3 out

## [1] 0.09521128

# Determine outliers  
  
data <- read.csv("trans\_120s\_split\_norm.csv")  
  
# Create subset of data   
data\_subset <- subset(data, select = c(even\_120s\_norm\_FromA\_ToF, odd\_120s\_norm\_FromA\_ToF))  
  
# Minimum Covariance Determinant  
output75 <- cov.mcd(data\_subset, quantile.used = nrow(data\_subset)\*.75)  
mhmcd75 <- mahalanobis(data\_subset, output75$center, output75$cov)  
alpha <- .001  
cutoff <- (qchisq(p = 1 - alpha, df = ncol(data\_subset)))  
names\_outlier\_MCD75 <- which(mhmcd75 > cutoff)  
data\_reduced <- data[-c(names\_outlier\_MCD75), ] # Remove outliers  
  
spearman\_brown(data\_reduced$even\_120s\_norm\_FromA\_ToF, data\_reduced$odd\_120s\_norm\_FromA\_ToF)

## [1] 0.2675295

48-nrow(data\_reduced)

## [1] 1

# Determine outliers  
  
data <- read.csv("trans\_120s\_split\_norm.csv")  
  
# Create subset of data   
data\_subset <- subset(data, select = c(even\_120s\_norm\_FromB\_ToA, odd\_120s\_norm\_FromB\_ToA))  
  
# Minimum Covariance Determinant  
output75 <- cov.mcd(data\_subset, quantile.used = nrow(data\_subset)\*.75)  
mhmcd75 <- mahalanobis(data\_subset, output75$center, output75$cov)  
alpha <- .001  
cutoff <- (qchisq(p = 1 - alpha, df = ncol(data\_subset)))  
names\_outlier\_MCD75 <- which(mhmcd75 > cutoff)  
data\_reduced <- data[-c(names\_outlier\_MCD75), ] # Remove outliers  
  
spearman\_brown(data\_reduced$even\_120s\_norm\_FromB\_ToA, data\_reduced$odd\_120s\_norm\_FromB\_ToA)

## [1] 0.4518237

48-nrow(data\_reduced)

## [1] 3

# Determine outliers  
  
data <- read.csv("trans\_120s\_split\_norm.csv")  
  
# Create subset of data   
data\_subset <- subset(data, select = c(even\_120s\_norm\_FromC\_ToB, odd\_120s\_norm\_FromC\_ToB))  
  
# Minimum Covariance Determinant  
output75 <- cov.mcd(data\_subset, quantile.used = nrow(data\_subset)\*.75)  
mhmcd75 <- mahalanobis(data\_subset, output75$center, output75$cov)  
alpha <- .001  
cutoff <- (qchisq(p = 1 - alpha, df = ncol(data\_subset)))  
names\_outlier\_MCD75 <- which(mhmcd75 > cutoff)  
data\_reduced <- data[-c(names\_outlier\_MCD75), ] # Remove outliers  
  
spearman\_brown(data\_reduced$even\_120s\_norm\_FromC\_ToB, data\_reduced$odd\_120s\_norm\_FromC\_ToB)

## [1] 0.5375335

48-nrow(data\_reduced)

## [1] 1

# Determine outliers  
  
data <- read.csv("trans\_120s\_split\_norm.csv")  
  
# Create subset of data   
data\_subset <- subset(data, select = c(even\_120s\_norm\_FromD\_ToA, odd\_120s\_norm\_FromD\_ToA))  
  
# Minimum Covariance Determinant  
output75 <- cov.mcd(data\_subset, quantile.used = nrow(data\_subset)\*.75)  
mhmcd75 <- mahalanobis(data\_subset, output75$center, output75$cov)  
alpha <- .001  
cutoff <- (qchisq(p = 1 - alpha, df = ncol(data\_subset)))  
names\_outlier\_MCD75 <- which(mhmcd75 > cutoff)  
data\_reduced <- data[-c(names\_outlier\_MCD75), ] # Remove outliers  
  
spearman\_brown(data\_reduced$even\_120s\_norm\_FromD\_ToA, data\_reduced$odd\_120s\_norm\_FromD\_ToA)

## [1] -0.04505575

48-nrow(data\_reduced)

## [1] 1

# Determine outliers  
  
data <- read.csv("trans\_120s\_split\_norm.csv")  
  
# Create subset of data   
data\_subset <- subset(data, select = c(even\_120s\_norm\_FromD\_ToF, odd\_120s\_norm\_FromD\_ToF))  
  
# Minimum Covariance Determinant  
output75 <- cov.mcd(data\_subset, quantile.used = nrow(data\_subset)\*.75)  
mhmcd75 <- mahalanobis(data\_subset, output75$center, output75$cov)  
alpha <- .001  
cutoff <- (qchisq(p = 1 - alpha, df = ncol(data\_subset)))  
names\_outlier\_MCD75 <- which(mhmcd75 > cutoff)  
data\_reduced <- data[-c(names\_outlier\_MCD75), ] # Remove outliers  
  
spearman\_brown(data\_reduced$even\_120s\_norm\_FromD\_ToF, data\_reduced$odd\_120s\_norm\_FromD\_ToF)

## [1] -0.0554694

48-nrow(data\_reduced)

## [1] 1

# Determine outliers  
  
data <- read.csv("trans\_120s\_split\_norm.csv")  
  
# Create subset of data   
data\_subset <- subset(data, select = c(even\_120s\_norm\_FromF\_ToC, odd\_120s\_norm\_FromF\_ToC))  
  
# Minimum Covariance Determinant  
output75 <- cov.mcd(data\_subset, quantile.used = nrow(data\_subset)\*.75)  
mhmcd75 <- mahalanobis(data\_subset, output75$center, output75$cov)  
alpha <- .001  
cutoff <- (qchisq(p = 1 - alpha, df = ncol(data\_subset)))  
names\_outlier\_MCD75 <- which(mhmcd75 > cutoff)  
data\_reduced <- data[-c(names\_outlier\_MCD75), ] # Remove outliers  
  
spearman\_brown(data\_reduced$even\_120s\_norm\_FromF\_ToC, data\_reduced$odd\_120s\_norm\_FromF\_ToC)

## [1] 0.2614296

48-nrow(data\_reduced)

## [1] 1

# Determine outliers  
  
data <- read.csv("trans\_120s\_split\_norm.csv")  
  
# Create subset of data   
data\_subset <- subset(data, select = c(even\_120s\_norm\_FromF\_ToD, odd\_120s\_norm\_FromF\_ToD))  
  
# Minimum Covariance Determinant  
output75 <- cov.mcd(data\_subset, quantile.used = nrow(data\_subset)\*.75)  
mhmcd75 <- mahalanobis(data\_subset, output75$center, output75$cov)  
alpha <- .001  
cutoff <- (qchisq(p = 1 - alpha, df = ncol(data\_subset)))  
names\_outlier\_MCD75 <- which(mhmcd75 > cutoff)  
data\_reduced <- data[-c(names\_outlier\_MCD75), ] # Remove outliers  
  
spearman\_brown(data\_reduced$even\_120s\_norm\_FromF\_ToD, data\_reduced$odd\_120s\_norm\_FromF\_ToD)

## [1] -0.04442563

48-nrow(data\_reduced)

## [1] 3

# 3 Minutes  
# Without Outliers Removed  
  
# Read data  
data <- read.csv("trans\_180s\_split\_norm.csv")  
  
spearman\_brown(data$even\_180s\_norm\_FromA\_ToB, data$odd\_180s\_norm\_FromA\_ToB) # 2 out

## [1] -0.004519832

spearman\_brown(data$even\_180s\_norm\_FromA\_ToC, data$odd\_180s\_norm\_FromA\_ToC) # 2 out

## [1] 0.3300152

spearman\_brown(data$even\_180s\_norm\_FromA\_ToD, data$odd\_180s\_norm\_FromA\_ToD) # No out

## [1] 0.550771

spearman\_brown(data$even\_180s\_norm\_FromA\_ToF, data$odd\_180s\_norm\_FromA\_ToF) # No out

## [1] 0.008660438

spearman\_brown(data$even\_180s\_norm\_FromB\_ToA, data$odd\_180s\_norm\_FromB\_ToA) # No out

## [1] 0.1546327

spearman\_brown(data$even\_180s\_norm\_FromB\_ToC, data$odd\_180s\_norm\_FromB\_ToC) # No out

## [1] 0.2801414

spearman\_brown(data$even\_180s\_norm\_FromB\_ToD, data$odd\_180s\_norm\_FromB\_ToD) # 1 out

## [1] -0.1042414

spearman\_brown(data$even\_180s\_norm\_FromB\_ToF, data$odd\_180s\_norm\_FromB\_ToF) # No out

## [1] 0.5662442

spearman\_brown(data$even\_180s\_norm\_FromC\_ToA, data$odd\_180s\_norm\_FromC\_ToA) # No out

## [1] 0.3983507

spearman\_brown(data$even\_180s\_norm\_FromC\_ToB, data$odd\_180s\_norm\_FromC\_ToB) # 1 out

## [1] -0.05856659

spearman\_brown(data$even\_180s\_norm\_FromC\_ToD, data$odd\_180s\_norm\_FromC\_ToD) # No out

## [1] 0.4725598

spearman\_brown(data$even\_180s\_norm\_FromC\_ToF, data$odd\_180s\_norm\_FromC\_ToF) # 1 out

## [1] 0.5756843

spearman\_brown(data$even\_180s\_norm\_FromD\_ToA, data$odd\_180s\_norm\_FromD\_ToA) # 4 out

## [1] -0.002644689

spearman\_brown(data$even\_180s\_norm\_FromD\_ToB, data$odd\_180s\_norm\_FromD\_ToB) # No out

## [1] 0.01016525

spearman\_brown(data$even\_180s\_norm\_FromD\_ToC, data$odd\_180s\_norm\_FromD\_ToC) # No out

## [1] 0.4462809

spearman\_brown(data$even\_180s\_norm\_FromD\_ToF, data$odd\_180s\_norm\_FromD\_ToF) # No out

## [1] 0.5081493

spearman\_brown(data$even\_180s\_norm\_FromF\_ToA, data$odd\_180s\_norm\_FromF\_ToA) # No out

## [1] -0.02600191

spearman\_brown(data$even\_180s\_norm\_FromF\_ToB, data$odd\_180s\_norm\_FromF\_ToB) # No out

## [1] 0.3216293

spearman\_brown(data$even\_180s\_norm\_FromF\_ToC, data$odd\_180s\_norm\_FromF\_ToC) # No out

## [1] 0.2398907

spearman\_brown(data$even\_180s\_norm\_FromF\_ToD, data$odd\_180s\_norm\_FromF\_ToD) # 1 out

## [1] 0.5676527

# Determine outliers  
  
data <- read.csv("trans\_180s\_split\_norm.csv")  
  
# Create subset of data   
data\_subset <- subset(data, select = c(even\_180s\_norm\_FromA\_ToB, odd\_180s\_norm\_FromA\_ToB))  
  
# Minimum Covariance Determinant  
output75 <- cov.mcd(data\_subset, quantile.used = nrow(data\_subset)\*.75)  
mhmcd75 <- mahalanobis(data\_subset, output75$center, output75$cov)  
alpha <- .001  
cutoff <- (qchisq(p = 1 - alpha, df = ncol(data\_subset)))  
names\_outlier\_MCD75 <- which(mhmcd75 > cutoff)  
data\_reduced <- data[-c(names\_outlier\_MCD75), ] # Remove outliers  
  
spearman\_brown(data\_reduced$even\_180s\_norm\_FromA\_ToB, data\_reduced$odd\_180s\_norm\_FromA\_ToB)

## [1] -0.2779971

48-nrow(data\_reduced)

## [1] 2

# Determine outliers  
  
data <- read.csv("trans\_180s\_split\_norm.csv")  
  
# Create subset of data   
data\_subset <- subset(data, select = c(even\_180s\_norm\_FromA\_ToC, odd\_180s\_norm\_FromA\_ToC))  
  
# Minimum Covariance Determinant  
output75 <- cov.mcd(data\_subset, quantile.used = nrow(data\_subset)\*.75)  
mhmcd75 <- mahalanobis(data\_subset, output75$center, output75$cov)  
alpha <- .001  
cutoff <- (qchisq(p = 1 - alpha, df = ncol(data\_subset)))  
names\_outlier\_MCD75 <- which(mhmcd75 > cutoff)  
data\_reduced <- data[-c(names\_outlier\_MCD75), ] # Remove outliers  
  
spearman\_brown(data\_reduced$even\_180s\_norm\_FromA\_ToC, data\_reduced$odd\_180s\_norm\_FromA\_ToC)

## [1] 0.5447976

48-nrow(data\_reduced)

## [1] 2

# Determine outliers  
  
data <- read.csv("trans\_180s\_split\_norm.csv")  
  
# Create subset of data   
data\_subset <- subset(data, select = c(even\_180s\_norm\_FromB\_ToD, odd\_180s\_norm\_FromB\_ToD))  
  
# Minimum Covariance Determinant  
output75 <- cov.mcd(data\_subset, quantile.used = nrow(data\_subset)\*.75)  
mhmcd75 <- mahalanobis(data\_subset, output75$center, output75$cov)  
alpha <- .001  
cutoff <- (qchisq(p = 1 - alpha, df = ncol(data\_subset)))  
names\_outlier\_MCD75 <- which(mhmcd75 > cutoff)  
data\_reduced <- data[-c(names\_outlier\_MCD75), ] # Remove outliers  
  
spearman\_brown(data\_reduced$even\_180s\_norm\_FromB\_ToD, data\_reduced$odd\_180s\_norm\_FromB\_ToD)

## [1] 0.2050463

48-nrow(data\_reduced)

## [1] 1

# Determine outliers  
  
data <- read.csv("trans\_180s\_split\_norm.csv")  
  
# Create subset of data   
data\_subset <- subset(data, select = c(even\_180s\_norm\_FromC\_ToB, odd\_180s\_norm\_FromC\_ToB))  
  
# Minimum Covariance Determinant  
output75 <- cov.mcd(data\_subset, quantile.used = nrow(data\_subset)\*.75)  
mhmcd75 <- mahalanobis(data\_subset, output75$center, output75$cov)  
alpha <- .001  
cutoff <- (qchisq(p = 1 - alpha, df = ncol(data\_subset)))  
names\_outlier\_MCD75 <- which(mhmcd75 > cutoff)  
data\_reduced <- data[-c(names\_outlier\_MCD75), ] # Remove outliers  
  
spearman\_brown(data\_reduced$even\_180s\_norm\_FromC\_ToB, data\_reduced$odd\_180s\_norm\_FromC\_ToB)

## [1] -0.2808096

48-nrow(data\_reduced)

## [1] 1

# Determine outliers  
  
data <- read.csv("trans\_180s\_split\_norm.csv")  
  
# Create subset of data   
data\_subset <- subset(data, select = c(even\_180s\_norm\_FromC\_ToF, odd\_180s\_norm\_FromC\_ToF))  
  
# Minimum Covariance Determinant  
output75 <- cov.mcd(data\_subset, quantile.used = nrow(data\_subset)\*.75)  
mhmcd75 <- mahalanobis(data\_subset, output75$center, output75$cov)  
alpha <- .001  
cutoff <- (qchisq(p = 1 - alpha, df = ncol(data\_subset)))  
names\_outlier\_MCD75 <- which(mhmcd75 > cutoff)  
data\_reduced <- data[-c(names\_outlier\_MCD75), ] # Remove outliers  
  
spearman\_brown(data\_reduced$even\_180s\_norm\_FromC\_ToF, data\_reduced$odd\_180s\_norm\_FromC\_ToF)

## [1] 0.5292443

48-nrow(data\_reduced)

## [1] 1

# Determine outliers  
  
data <- read.csv("trans\_180s\_split\_norm.csv")  
  
# Create subset of data   
data\_subset <- subset(data, select = c(even\_180s\_norm\_FromD\_ToA, odd\_180s\_norm\_FromD\_ToA))  
  
# Minimum Covariance Determinant  
output75 <- cov.mcd(data\_subset, quantile.used = nrow(data\_subset)\*.75)  
mhmcd75 <- mahalanobis(data\_subset, output75$center, output75$cov)  
alpha <- .001  
cutoff <- (qchisq(p = 1 - alpha, df = ncol(data\_subset)))  
names\_outlier\_MCD75 <- which(mhmcd75 > cutoff)  
data\_reduced <- data[-c(names\_outlier\_MCD75), ] # Remove outliers  
  
spearman\_brown(data\_reduced$even\_180s\_norm\_FromD\_ToA, data\_reduced$odd\_180s\_norm\_FromD\_ToA)

## [1] 0.2083061

48-nrow(data\_reduced)

## [1] 4

# Determine outliers  
  
data <- read.csv("trans\_180s\_split\_norm.csv")  
  
# Create subset of data   
data\_subset <- subset(data, select = c(even\_180s\_norm\_FromF\_ToD, odd\_180s\_norm\_FromF\_ToD))  
  
# Minimum Covariance Determinant  
output75 <- cov.mcd(data\_subset, quantile.used = nrow(data\_subset)\*.75)  
mhmcd75 <- mahalanobis(data\_subset, output75$center, output75$cov)  
alpha <- .001  
cutoff <- (qchisq(p = 1 - alpha, df = ncol(data\_subset)))  
names\_outlier\_MCD75 <- which(mhmcd75 > cutoff)  
data\_reduced <- data[-c(names\_outlier\_MCD75), ] # Remove outliers  
  
spearman\_brown(data\_reduced$even\_180s\_norm\_FromF\_ToD, data\_reduced$odd\_180s\_norm\_FromF\_ToD)

## [1] 0.6254846

48-nrow(data\_reduced)

## [1] 1

# 4 Minutes  
# Without Outliers Removed  
  
# Read data  
data <- read.csv("trans\_240s\_split\_norm.csv")  
  
spearman\_brown(data$even\_240s\_norm\_FromA\_ToB, data$odd\_240s\_norm\_FromA\_ToB) # No out

## [1] 0.2833564

spearman\_brown(data$even\_240s\_norm\_FromA\_ToC, data$odd\_240s\_norm\_FromA\_ToC) # No out

## [1] 0.2474414

spearman\_brown(data$even\_240s\_norm\_FromA\_ToD, data$odd\_240s\_norm\_FromA\_ToD) # No out

## [1] 0.1505455

spearman\_brown(data$even\_240s\_norm\_FromA\_ToF, data$odd\_240s\_norm\_FromA\_ToF) # 1 out

## [1] -0.1892702

spearman\_brown(data$even\_240s\_norm\_FromB\_ToA, data$odd\_240s\_norm\_FromB\_ToA) # 1 out

## [1] 0.5185269

spearman\_brown(data$even\_240s\_norm\_FromB\_ToC, data$odd\_240s\_norm\_FromB\_ToC) # No out

## [1] 0.2190242

spearman\_brown(data$even\_240s\_norm\_FromB\_ToD, data$odd\_240s\_norm\_FromB\_ToD) # No out

## [1] 0.09066297

spearman\_brown(data$even\_240s\_norm\_FromB\_ToF, data$odd\_240s\_norm\_FromB\_ToF) # No out

## [1] 0.5612714

spearman\_brown(data$even\_240s\_norm\_FromC\_ToA, data$odd\_240s\_norm\_FromC\_ToA) # No out

## [1] 0.0802955

spearman\_brown(data$even\_240s\_norm\_FromC\_ToB, data$odd\_240s\_norm\_FromC\_ToB) # 1 out

## [1] -0.04086641

spearman\_brown(data$even\_240s\_norm\_FromC\_ToD, data$odd\_240s\_norm\_FromC\_ToD) # No out

## [1] 0.3891475

spearman\_brown(data$even\_240s\_norm\_FromC\_ToF, data$odd\_240s\_norm\_FromC\_ToF) # No out

## [1] 0.4301945

spearman\_brown(data$even\_240s\_norm\_FromD\_ToA, data$odd\_240s\_norm\_FromD\_ToA) # 2 out

## [1] 0.4023143

spearman\_brown(data$even\_240s\_norm\_FromD\_ToB, data$odd\_240s\_norm\_FromD\_ToB) # No out

## [1] -0.004634365

spearman\_brown(data$even\_240s\_norm\_FromD\_ToC, data$odd\_240s\_norm\_FromD\_ToC) # No out

## [1] 0.417836

spearman\_brown(data$even\_240s\_norm\_FromD\_ToF, data$odd\_240s\_norm\_FromD\_ToF) # 1 out

## [1] 0.4901575

spearman\_brown(data$even\_240s\_norm\_FromF\_ToA, data$odd\_240s\_norm\_FromF\_ToA) # No out

## [1] 0.03313485

spearman\_brown(data$even\_240s\_norm\_FromF\_ToB, data$odd\_240s\_norm\_FromF\_ToB) # No out

## [1] 0.3436042

spearman\_brown(data$even\_240s\_norm\_FromF\_ToC, data$odd\_240s\_norm\_FromF\_ToC) # 1 out

## [1] 0.5880133

spearman\_brown(data$even\_240s\_norm\_FromF\_ToD, data$odd\_240s\_norm\_FromF\_ToD) # No out

## [1] 0.5806371

# Determine outliers  
  
data <- read.csv("trans\_240s\_split\_norm.csv")  
  
# Create subset of data   
data\_subset <- subset(data, select = c(even\_240s\_norm\_FromA\_ToF, odd\_240s\_norm\_FromA\_ToF))  
  
# Minimum Covariance Determinant  
output75 <- cov.mcd(data\_subset, quantile.used = nrow(data\_subset)\*.75)  
mhmcd75 <- mahalanobis(data\_subset, output75$center, output75$cov)  
alpha <- .001  
cutoff <- (qchisq(p = 1 - alpha, df = ncol(data\_subset)))  
names\_outlier\_MCD75 <- which(mhmcd75 > cutoff)  
data\_reduced <- data[-c(names\_outlier\_MCD75), ] # Remove outliers  
  
spearman\_brown(data\_reduced$even\_240s\_norm\_FromA\_ToF, data\_reduced$odd\_240s\_norm\_FromA\_ToF)

## [1] -0.03109652

48-nrow(data\_reduced)

## [1] 1

# Determine outliers  
  
data <- read.csv("trans\_240s\_split\_norm.csv")  
  
# Create subset of data   
data\_subset <- subset(data, select = c(even\_240s\_norm\_FromB\_ToA, odd\_240s\_norm\_FromB\_ToA))  
  
# Minimum Covariance Determinant  
output75 <- cov.mcd(data\_subset, quantile.used = nrow(data\_subset)\*.75)  
mhmcd75 <- mahalanobis(data\_subset, output75$center, output75$cov)  
alpha <- .001  
cutoff <- (qchisq(p = 1 - alpha, df = ncol(data\_subset)))  
names\_outlier\_MCD75 <- which(mhmcd75 > cutoff)  
data\_reduced <- data[-c(names\_outlier\_MCD75), ] # Remove outliers  
  
spearman\_brown(data\_reduced$even\_240s\_norm\_FromB\_ToA, data\_reduced$odd\_240s\_norm\_FromB\_ToA)

## [1] 0.4578367

48-nrow(data\_reduced)

## [1] 1

# Determine outliers  
  
data <- read.csv("trans\_240s\_split\_norm.csv")  
  
# Create subset of data   
data\_subset <- subset(data, select = c(even\_240s\_norm\_FromC\_ToB, odd\_240s\_norm\_FromC\_ToB))  
  
# Minimum Covariance Determinant  
output75 <- cov.mcd(data\_subset, quantile.used = nrow(data\_subset)\*.75)  
mhmcd75 <- mahalanobis(data\_subset, output75$center, output75$cov)  
alpha <- .001  
cutoff <- (qchisq(p = 1 - alpha, df = ncol(data\_subset)))  
names\_outlier\_MCD75 <- which(mhmcd75 > cutoff)  
data\_reduced <- data[-c(names\_outlier\_MCD75), ] # Remove outliers  
  
spearman\_brown(data\_reduced$even\_240s\_norm\_FromC\_ToB, data\_reduced$odd\_240s\_norm\_FromC\_ToB)

## [1] -0.3906856

48-nrow(data\_reduced)

## [1] 1

# Determine outliers  
  
data <- read.csv("trans\_240s\_split\_norm.csv")  
  
# Create subset of data   
data\_subset <- subset(data, select = c(even\_240s\_norm\_FromD\_ToA, odd\_240s\_norm\_FromD\_ToA))  
  
# Minimum Covariance Determinant  
output75 <- cov.mcd(data\_subset, quantile.used = nrow(data\_subset)\*.75)  
mhmcd75 <- mahalanobis(data\_subset, output75$center, output75$cov)  
alpha <- .001  
cutoff <- (qchisq(p = 1 - alpha, df = ncol(data\_subset)))  
names\_outlier\_MCD75 <- which(mhmcd75 > cutoff)  
data\_reduced <- data[-c(names\_outlier\_MCD75), ] # Remove outliers  
  
spearman\_brown(data\_reduced$even\_240s\_norm\_FromD\_ToA, data\_reduced$odd\_240s\_norm\_FromD\_ToA)

## [1] 0.2655272

48-nrow(data\_reduced)

## [1] 2

# Determine outliers  
  
data <- read.csv("trans\_240s\_split\_norm.csv")  
  
# Create subset of data   
data\_subset <- subset(data, select = c(even\_240s\_norm\_FromD\_ToF, odd\_240s\_norm\_FromD\_ToF))  
  
# Minimum Covariance Determinant  
output75 <- cov.mcd(data\_subset, quantile.used = nrow(data\_subset)\*.75)  
mhmcd75 <- mahalanobis(data\_subset, output75$center, output75$cov)  
alpha <- .001  
cutoff <- (qchisq(p = 1 - alpha, df = ncol(data\_subset)))  
names\_outlier\_MCD75 <- which(mhmcd75 > cutoff)  
data\_reduced <- data[-c(names\_outlier\_MCD75), ] # Remove outliers  
  
spearman\_brown(data\_reduced$even\_240s\_norm\_FromD\_ToF, data\_reduced$odd\_240s\_norm\_FromD\_ToF)

## [1] 0.6617485

48-nrow(data\_reduced)

## [1] 1

# Determine outliers  
  
data <- read.csv("trans\_240s\_split\_norm.csv")  
  
# Create subset of data   
data\_subset <- subset(data, select = c(even\_240s\_norm\_FromF\_ToC, odd\_240s\_norm\_FromF\_ToC))  
  
# Minimum Covariance Determinant  
output75 <- cov.mcd(data\_subset, quantile.used = nrow(data\_subset)\*.75)  
mhmcd75 <- mahalanobis(data\_subset, output75$center, output75$cov)  
alpha <- .001  
cutoff <- (qchisq(p = 1 - alpha, df = ncol(data\_subset)))  
names\_outlier\_MCD75 <- which(mhmcd75 > cutoff)  
data\_reduced <- data[-c(names\_outlier\_MCD75), ] # Remove outliers  
  
spearman\_brown(data\_reduced$even\_240s\_norm\_FromF\_ToC, data\_reduced$odd\_240s\_norm\_FromF\_ToC)

## [1] 0.5168821

48-nrow(data\_reduced)

## [1] 1

# 5 Minutes  
# Without Outliers Removed  
  
# Read data  
data <- read.csv("trans\_300s\_split\_norm.csv")  
  
spearman\_brown(data$even\_300s\_norm\_FromA\_ToB, data$odd\_300s\_norm\_FromA\_ToB) # 2 out

## [1] 0.1065244

spearman\_brown(data$even\_300s\_norm\_FromA\_ToC, data$odd\_300s\_norm\_FromA\_ToC) # 1 out

## [1] 0.3364467

spearman\_brown(data$even\_300s\_norm\_FromA\_ToD, data$odd\_300s\_norm\_FromA\_ToD) # 2 out

## [1] 0.1339441

spearman\_brown(data$even\_300s\_norm\_FromA\_ToF, data$odd\_300s\_norm\_FromA\_ToF) # No out

## [1] -0.07729205

spearman\_brown(data$even\_300s\_norm\_FromB\_ToA, data$odd\_300s\_norm\_FromB\_ToA) # 1 out

## [1] 0.1621291

spearman\_brown(data$even\_300s\_norm\_FromB\_ToC, data$odd\_300s\_norm\_FromB\_ToC) # No out

## [1] 0.163565

spearman\_brown(data$even\_300s\_norm\_FromB\_ToD, data$odd\_300s\_norm\_FromB\_ToD) # No out

## [1] 0.09231759

spearman\_brown(data$even\_300s\_norm\_FromB\_ToF, data$odd\_300s\_norm\_FromB\_ToF) # No out

## [1] 0.6038667

spearman\_brown(data$even\_300s\_norm\_FromC\_ToA, data$odd\_300s\_norm\_FromC\_ToA) # No out

## [1] 0.2130784

spearman\_brown(data$even\_300s\_norm\_FromC\_ToB, data$odd\_300s\_norm\_FromC\_ToB) # 1 out

## [1] -0.08638245

spearman\_brown(data$even\_300s\_norm\_FromC\_ToD, data$odd\_300s\_norm\_FromC\_ToD) # No out

## [1] 0.5283957

spearman\_brown(data$even\_300s\_norm\_FromC\_ToF, data$odd\_300s\_norm\_FromC\_ToF) # 1 out

## [1] 0.5000057

spearman\_brown(data$even\_300s\_norm\_FromD\_ToA, data$odd\_300s\_norm\_FromD\_ToA) # No out

## [1] 0.2649527

spearman\_brown(data$even\_300s\_norm\_FromD\_ToB, data$odd\_300s\_norm\_FromD\_ToB) # No out

## [1] 0.2567707

spearman\_brown(data$even\_300s\_norm\_FromD\_ToC, data$odd\_300s\_norm\_FromD\_ToC) # No out

## [1] 0.4261042

spearman\_brown(data$even\_300s\_norm\_FromD\_ToF, data$odd\_300s\_norm\_FromD\_ToF) # 2 out

## [1] 0.4552898

spearman\_brown(data$even\_300s\_norm\_FromF\_ToA, data$odd\_300s\_norm\_FromF\_ToA) # No out

## [1] 0.3899396

spearman\_brown(data$even\_300s\_norm\_FromF\_ToB, data$odd\_300s\_norm\_FromF\_ToB) # No out

## [1] 0.1946691

spearman\_brown(data$even\_300s\_norm\_FromF\_ToC, data$odd\_300s\_norm\_FromF\_ToC) # No out

## [1] 0.1651046

spearman\_brown(data$even\_300s\_norm\_FromF\_ToD, data$odd\_300s\_norm\_FromF\_ToD) # 2 out

## [1] 0.723906

# Determine outliers  
  
data <- read.csv("trans\_300s\_split\_norm.csv")  
  
# Create subset of data   
data\_subset <- subset(data, select = c(even\_300s\_norm\_FromA\_ToB, odd\_300s\_norm\_FromA\_ToB))  
  
# Minimum Covariance Determinant  
output75 <- cov.mcd(data\_subset, quantile.used = nrow(data\_subset)\*.75)  
mhmcd75 <- mahalanobis(data\_subset, output75$center, output75$cov)  
alpha <- .001  
cutoff <- (qchisq(p = 1 - alpha, df = ncol(data\_subset)))  
names\_outlier\_MCD75 <- which(mhmcd75 > cutoff)  
data\_reduced <- data[-c(names\_outlier\_MCD75), ] # Remove outliers  
  
spearman\_brown(data\_reduced$even\_300s\_norm\_FromA\_ToB, data\_reduced$odd\_300s\_norm\_FromA\_ToB)

## [1] 0.3632859

48-nrow(data\_reduced)

## [1] 2

# Determine outliers  
  
data <- read.csv("trans\_300s\_split\_norm.csv")  
  
# Create subset of data   
data\_subset <- subset(data, select = c(even\_300s\_norm\_FromA\_ToC, odd\_300s\_norm\_FromA\_ToC))  
  
# Minimum Covariance Determinant  
output75 <- cov.mcd(data\_subset, quantile.used = nrow(data\_subset)\*.75)  
mhmcd75 <- mahalanobis(data\_subset, output75$center, output75$cov)  
alpha <- .001  
cutoff <- (qchisq(p = 1 - alpha, df = ncol(data\_subset)))  
names\_outlier\_MCD75 <- which(mhmcd75 > cutoff)  
data\_reduced <- data[-c(names\_outlier\_MCD75), ] # Remove outliers  
  
spearman\_brown(data\_reduced$even\_300s\_norm\_FromA\_ToC, data\_reduced$odd\_300s\_norm\_FromA\_ToC)

## [1] 0.3744955

48-nrow(data\_reduced)

## [1] 1

# Determine outliers  
  
data <- read.csv("trans\_300s\_split\_norm.csv")  
  
# Create subset of data   
data\_subset <- subset(data, select = c(even\_300s\_norm\_FromA\_ToD, odd\_300s\_norm\_FromA\_ToD))  
  
# Minimum Covariance Determinant  
output75 <- cov.mcd(data\_subset, quantile.used = nrow(data\_subset)\*.75)  
mhmcd75 <- mahalanobis(data\_subset, output75$center, output75$cov)  
alpha <- .001  
cutoff <- (qchisq(p = 1 - alpha, df = ncol(data\_subset)))  
names\_outlier\_MCD75 <- which(mhmcd75 > cutoff)  
data\_reduced <- data[-c(names\_outlier\_MCD75), ] # Remove outliers  
  
spearman\_brown(data\_reduced$even\_300s\_norm\_FromA\_ToD, data\_reduced$odd\_300s\_norm\_FromA\_ToD)

## [1] -0.2325342

48-nrow(data\_reduced)

## [1] 2

# Determine outliers  
  
data <- read.csv("trans\_300s\_split\_norm.csv")  
  
# Create subset of data   
data\_subset <- subset(data, select = c(even\_300s\_norm\_FromB\_ToA, odd\_300s\_norm\_FromB\_ToA))  
  
# Minimum Covariance Determinant  
output75 <- cov.mcd(data\_subset, quantile.used = nrow(data\_subset)\*.75)  
mhmcd75 <- mahalanobis(data\_subset, output75$center, output75$cov)  
alpha <- .001  
cutoff <- (qchisq(p = 1 - alpha, df = ncol(data\_subset)))  
names\_outlier\_MCD75 <- which(mhmcd75 > cutoff)  
data\_reduced <- data[-c(names\_outlier\_MCD75), ] # Remove outliers  
  
spearman\_brown(data\_reduced$even\_300s\_norm\_FromB\_ToA, data\_reduced$odd\_300s\_norm\_FromB\_ToA)

## [1] -0.09856001

48-nrow(data\_reduced)

## [1] 1

# Determine outliers  
  
data <- read.csv("trans\_300s\_split\_norm.csv")  
  
# Create subset of data   
data\_subset <- subset(data, select = c(even\_300s\_norm\_FromC\_ToB, odd\_300s\_norm\_FromC\_ToB))  
  
# Minimum Covariance Determinant  
output75 <- cov.mcd(data\_subset, quantile.used = nrow(data\_subset)\*.75)  
mhmcd75 <- mahalanobis(data\_subset, output75$center, output75$cov)  
alpha <- .001  
cutoff <- (qchisq(p = 1 - alpha, df = ncol(data\_subset)))  
names\_outlier\_MCD75 <- which(mhmcd75 > cutoff)  
data\_reduced <- data[-c(names\_outlier\_MCD75), ] # Remove outliers  
  
spearman\_brown(data\_reduced$even\_300s\_norm\_FromC\_ToB, data\_reduced$odd\_300s\_norm\_FromC\_ToB)

## [1] -0.289465

48-nrow(data\_reduced)

## [1] 1

# Determine outliers  
  
data <- read.csv("trans\_300s\_split\_norm.csv")  
  
# Create subset of data   
data\_subset <- subset(data, select = c(even\_300s\_norm\_FromC\_ToF, odd\_300s\_norm\_FromC\_ToF))  
  
# Minimum Covariance Determinant  
output75 <- cov.mcd(data\_subset, quantile.used = nrow(data\_subset)\*.75)  
mhmcd75 <- mahalanobis(data\_subset, output75$center, output75$cov)  
alpha <- .001  
cutoff <- (qchisq(p = 1 - alpha, df = ncol(data\_subset)))  
names\_outlier\_MCD75 <- which(mhmcd75 > cutoff)  
data\_reduced <- data[-c(names\_outlier\_MCD75), ] # Remove outliers  
  
spearman\_brown(data\_reduced$even\_300s\_norm\_FromC\_ToF, data\_reduced$odd\_300s\_norm\_FromC\_ToF)

## [1] 0.511611

48-nrow(data\_reduced)

## [1] 1

# Determine outliers  
  
data <- read.csv("trans\_300s\_split\_norm.csv")  
  
# Create subset of data   
data\_subset <- subset(data, select = c(even\_300s\_norm\_FromD\_ToF, odd\_300s\_norm\_FromD\_ToF))  
  
# Minimum Covariance Determinant  
output75 <- cov.mcd(data\_subset, quantile.used = nrow(data\_subset)\*.75)  
mhmcd75 <- mahalanobis(data\_subset, output75$center, output75$cov)  
alpha <- .001  
cutoff <- (qchisq(p = 1 - alpha, df = ncol(data\_subset)))  
names\_outlier\_MCD75 <- which(mhmcd75 > cutoff)  
data\_reduced <- data[-c(names\_outlier\_MCD75), ] # Remove outliers  
  
spearman\_brown(data\_reduced$even\_300s\_norm\_FromD\_ToF, data\_reduced$odd\_300s\_norm\_FromD\_ToF)

## [1] 0.5760813

48-nrow(data\_reduced)

## [1] 2

# Determine outliers  
  
data <- read.csv("trans\_300s\_split\_norm.csv")  
  
# Create subset of data   
data\_subset <- subset(data, select = c(even\_300s\_norm\_FromF\_ToD, odd\_300s\_norm\_FromF\_ToD))  
  
# Minimum Covariance Determinant  
output75 <- cov.mcd(data\_subset, quantile.used = nrow(data\_subset)\*.75)  
mhmcd75 <- mahalanobis(data\_subset, output75$center, output75$cov)  
alpha <- .001  
cutoff <- (qchisq(p = 1 - alpha, df = ncol(data\_subset)))  
names\_outlier\_MCD75 <- which(mhmcd75 > cutoff)  
data\_reduced <- data[-c(names\_outlier\_MCD75), ] # Remove outliers  
  
spearman\_brown(data\_reduced$even\_300s\_norm\_FromF\_ToD, data\_reduced$odd\_300s\_norm\_FromF\_ToD)

## [1] 0.8084492

48-nrow(data\_reduced)

## [1] 2