Supplementary Information for:

An Alternative to the Bland-Altman Repeated-Measures Correlation to

Account for Variability of Slopes Across Persons

Table S1. Simulation Conditions

Condition Type	Parameter	Possible Values
Limit parameters (1 per simulation)	N (number of persons)	random uniform 2 to 100
	Maximum within-person correlation (rmcorr_max)	random uniform 0 to 1
	Minimum within-person correlation (rmcorr_min)	random uniform -1 to rmcorr_max
	Minimum n within-person (min_n)	random uniform 3 to 5
	Maximum n within-person (max_n)	random uniform min_n to 10
Within-person parameters (1 per person per simulation)	n within person	random uniform min_n to max_n
	Within-person correlation	random uniform rmcorr_min to rmcorr_max
	Scaling of within-person data	random uniform SD=0.10 to SD=2.00
	Absolute shift of within-person data	random standard normal for each† of X1 and X2

Note. †all points within a simulated person are shifted positively or negatively, where X1 and X2 do not necessarily receive the same shift – e.g. if the (X1,X2) shift values were (1,-2), all X1 points for that person would be shifted up 1 unit and all X2 points would be shifted down 2 units.

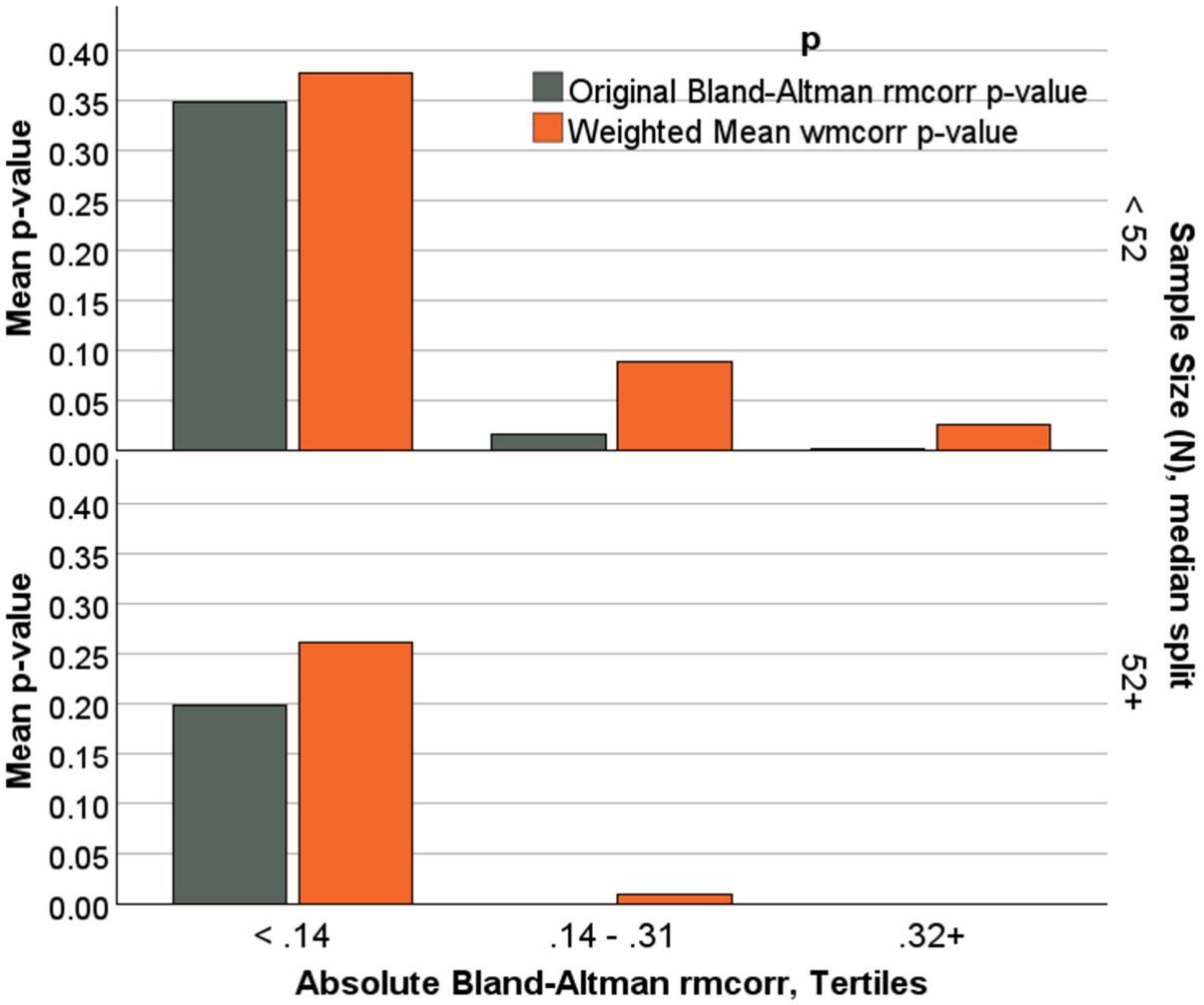


Figure S1. Comparison of Original (rmcorr) and Weighted Mean (wmcorr) p-values by N and Size of rmcorr

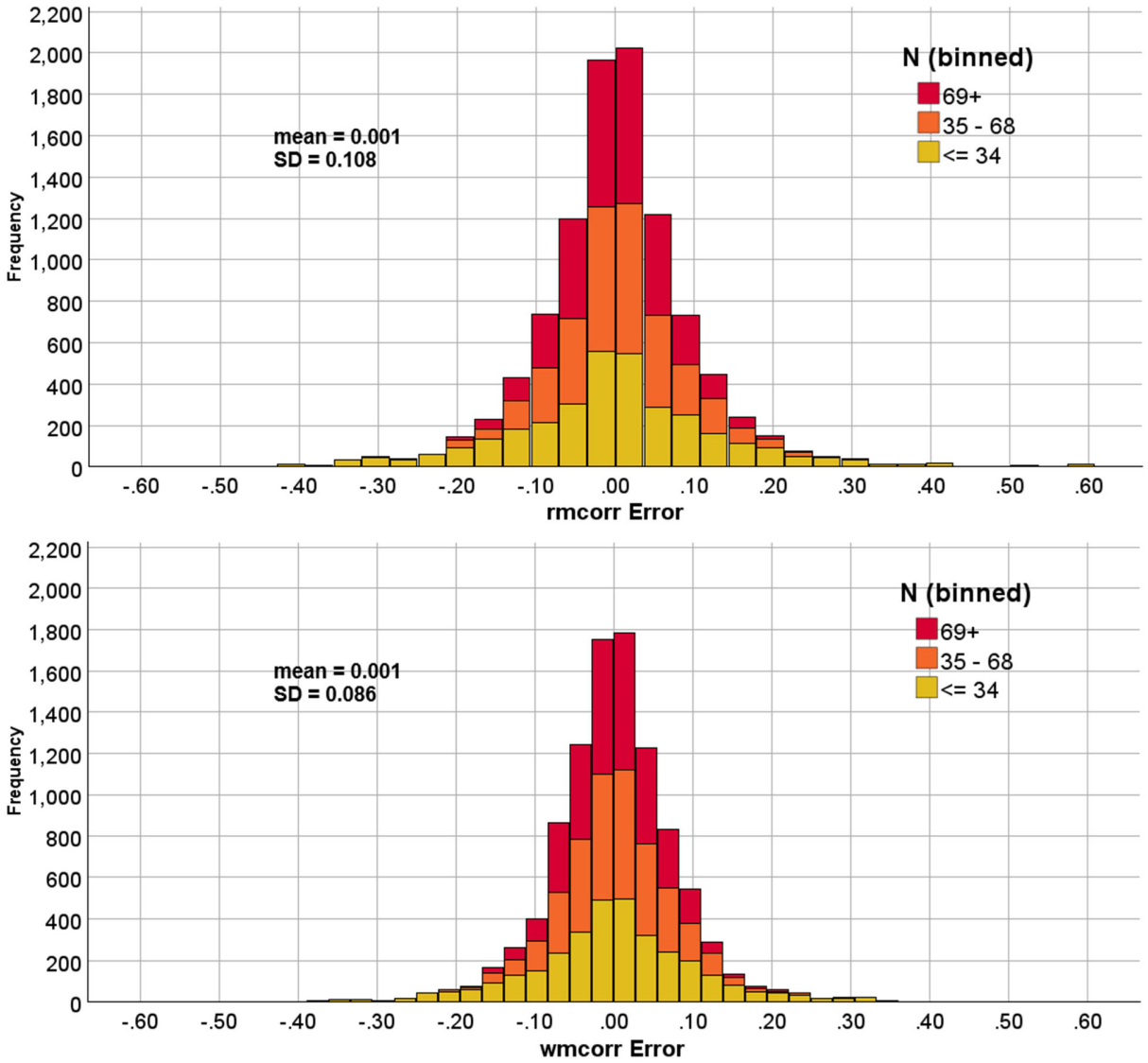


Figure S2. Error distributions for Original (rmcorr) and Weighted Mean (wmcorr) correlations, by N.

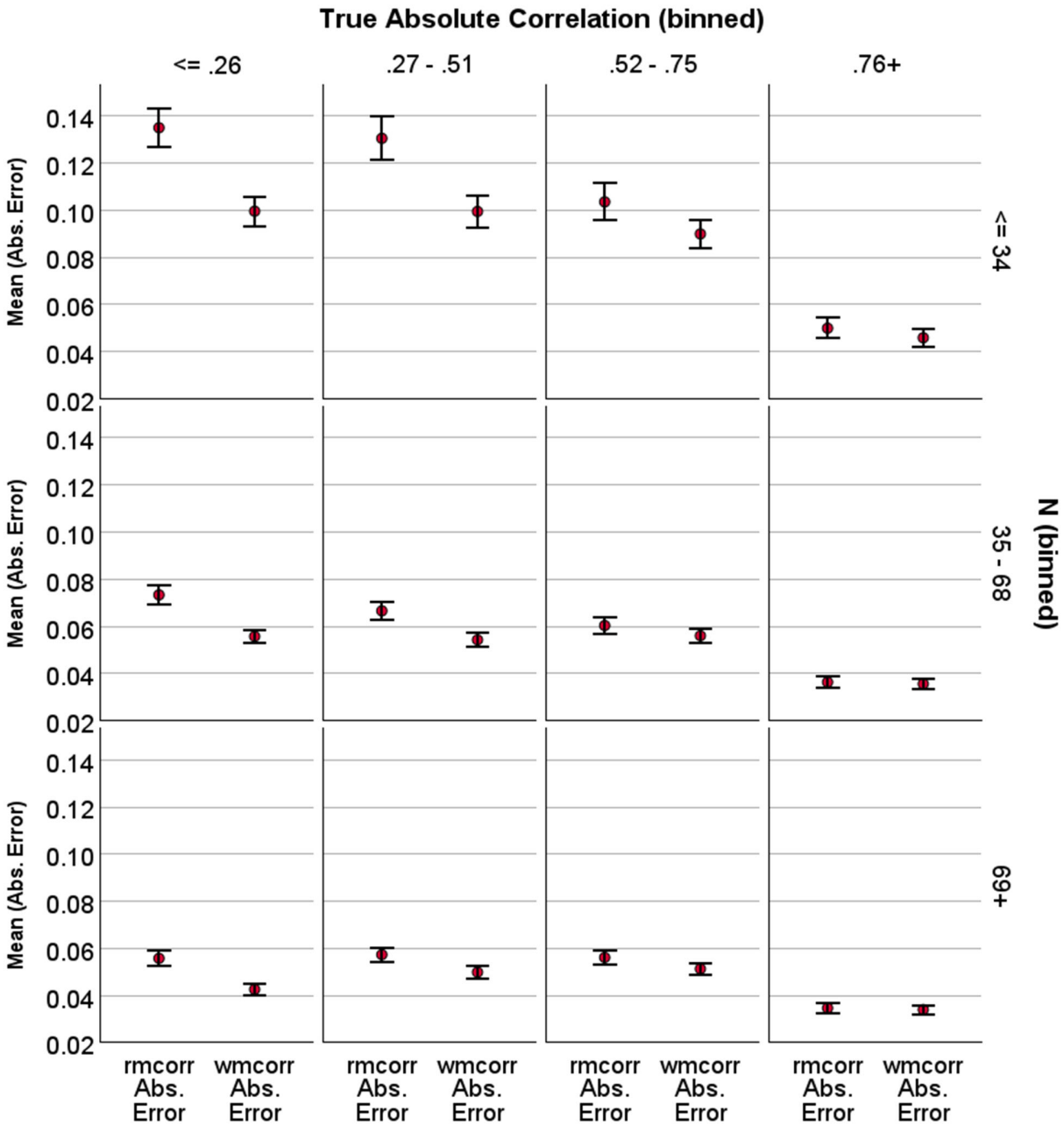


Figure S3. Mean absolute error (and 95% Confidence Intervals) for rmcorr and wmcorr, by N and absolute size of true (population) correlation.

Script for Estimating Correlations in this Manuscript

See Supplemental file "MB_weighted_corr.r" for the self-contained script, and it is provided here as well:

```
library(rmcorr)
library(weights)

###########################################################################
# Calculate original rmcorr and new wmcorr
# Data should be formatted such that the first column contains IDs, the
# second contains variable 1, the third contains variable 2, and the fourth
# contains numbers indicating how many total data points that participant
# has.
###########################################################################

# create example data set
dat <- as.data.frame(matrix(c(
1,-0.7,0.0,4,
1,0.1,0.7,4,
1,0.2,-0.6,4,
1,0.2,-0.7,4,
2,1.3,0.4,5,
2,-1.0,-0.8,5,
2,-0.4,-1.5,5,
2,1.0,-0.3,5,
2,0.9,-0.1,5,
3,0.7,-0.9,4,
3,-1.1,0.5,4,
3,-0.7,-1.1,4,
3,-2.7,-2.8,4,
4,-1.7,-0.3,3,
4,0.2,1.2,3,
4,0.6,1.2,3,
5,0.3,0.6,5,
5,0.6,-0.5,5,
5,1.2,1.1,5,
5,0.4,0.5,5,
5,0.6,0.7,5),21,4,byrow=TRUE))

# add column names; "pn" is the total number of measures for a subject
colnames(dat) <- c("ID","X1","X2","pn")

# your data should be formatted like this
dat

# convert ID column to factor for rmcorr() function
dat$ID <- as.factor(dat$ID)

# calculate the Bland-Altman repeated-measures correlation
rmmod <- rmcorr(ID,X1,X2,dat)

# prepare vector of IDs for use in loop below
ids <- unique(dat$ID)

# create matrix to hold output from loop below
```

```
corrs_temp <- matrix(NA,length(ids),2)

# loop through each ID and calculate person-level correlations
for (i in 1:length(ids)) {
temp <- dat[dat$ID == ids[i],]
corrs_temp[i,1] <- cor(temp[,2:3])[2,1]
corrs_temp[i,2] <- temp[1,4]
}

# remove rows with missing values
corrs_temp <- na.omit(corrs_temp)

################################################################################
# Using the corrs_temp object created above, calculate the weighted mean
# correlation (wtdcorr), as well as the p-value from a weighted t-test
################################################################################

# calculate the wtdcorr
wtd_mean_corr <- weighted.mean(corrs_temp[,1], w=sqrt(corrs_temp[,2]))

# perform the weighted t-test
wtd_t_test <- wtd.t.test(corrs_temp[,1], y=0, weight=sqrt(corrs_temp[,2]))

# view results of t-test
wtd_t_test$coefficients
```