Thesis Survey Data analysis

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library(GGally)

## Loading required package: ggplot2

## Registered S3 method overwritten by 'GGally':  
## method from   
## +.gg ggplot2

library(ggplot2)  
library(equatiomatic)  
library(psych)

##   
## Attaching package: 'psych'

## The following objects are masked from 'package:ggplot2':  
##   
## %+%, alpha

library(misty)

## |-------------------------------------|  
## | misty 0.4.5 (2022-04-29) |  
## | Miscellaneous Functions T. Yanagida |  
## |-------------------------------------|

library(vtable)

## Loading required package: kableExtra

library(ltm)

## Loading required package: MASS

## Loading required package: msm

## Loading required package: polycor

##   
## Attaching package: 'polycor'

## The following object is masked from 'package:psych':  
##   
## polyserial

##   
## Attaching package: 'ltm'

## The following object is masked from 'package:misty':  
##   
## descript

## The following object is masked from 'package:psych':  
##   
## factor.scores

teams <- read.csv("teams.csv")  
responses <- read.csv("responses.csv")

# st(responses,  
# vars = c("age", "tenure", "team\_history", "overconfidence", "voice"),  
# group = "gender", group.test = TRUE  
# )

coord\_df <- responses[, c("coord\_q1", "coord\_q2", "coord\_q3", "coord\_q4", "coord\_q5")]  
coord\_trans\_df <- as.data.frame(t(coord\_df))  
ICC(coord\_trans\_df)

## Call: ICC(x = coord\_trans\_df)  
##   
## Intraclass correlation coefficients   
## type ICC F df1 df2 p lower bound  
## Single\_raters\_absolute ICC1 0.080 7.9 4 390 4.2e-06 0.022  
## Single\_random\_raters ICC2 0.083 11.0 4 312 2.2e-08 0.026  
## Single\_fixed\_raters ICC3 0.113 11.0 4 312 2.2e-08 0.035  
## Average\_raters\_absolute ICC1k 0.873 7.9 4 390 4.2e-06 0.641  
## Average\_random\_raters ICC2k 0.877 11.0 4 312 2.2e-08 0.674  
## Average\_fixed\_raters ICC3k 0.909 11.0 4 312 2.2e-08 0.744  
## upper bound  
## Single\_raters\_absolute 0.45  
## Single\_random\_raters 0.45  
## Single\_fixed\_raters 0.53  
## Average\_raters\_absolute 0.98  
## Average\_random\_raters 0.98  
## Average\_fixed\_raters 0.99  
##   
## Number of subjects = 5 Number of Judges = 79  
## See the help file for a discussion of the other 4 McGraw and Wong estimates,

coord\_df$coord\_rating <- rowMeans(coord\_df)

ICC1 is

multilevel.icc(coord\_df$coord\_rating, cluster = responses$team, type = 1, method = "aov")

## [1] 0.4858979

ICC2 is

multilevel.icc(coord\_df$coord\_rating, cluster = responses$team, type = 2, method = "aov")

## [1] 0.7645034

eff\_df <- responses[, c("eff\_q1", "eff\_q2", "eff\_q3", "eff\_q4", "eff\_q5", "eff\_q6", "eff\_q7", "eff\_q8", "eff\_q9", "eff\_q10")]  
eff\_trans\_df <- as.data.frame(t(eff\_df))  
ICC(eff\_trans\_df)

## Call: ICC(x = eff\_trans\_df)  
##   
## Intraclass correlation coefficients   
## type ICC F df1 df2 p lower bound upper bound  
## Single\_raters\_absolute ICC1 0.15 15 9 780 6.9e-23 0.072 0.39  
## Single\_random\_raters ICC2 0.15 22 9 702 2.3e-33 0.075 0.39  
## Single\_fixed\_raters ICC3 0.21 22 9 702 2.3e-33 0.107 0.48  
## Average\_raters\_absolute ICC1k 0.93 15 9 780 6.9e-23 0.859 0.98  
## Average\_random\_raters ICC2k 0.94 22 9 702 2.3e-33 0.865 0.98  
## Average\_fixed\_raters ICC3k 0.96 22 9 702 2.3e-33 0.904 0.99  
##   
## Number of subjects = 10 Number of Judges = 79  
## See the help file for a discussion of the other 4 McGraw and Wong estimates,

eff\_df$eff\_rating <- rowMeans(eff\_df)

ICC1 is

multilevel.icc(eff\_df$eff\_rating, cluster = responses$team, type = 1, method = "aov")

## [1] 0.4018889

ICC2 is

multilevel.icc(eff\_df$eff\_rating, cluster = responses$team, type = 2, method = "aov")

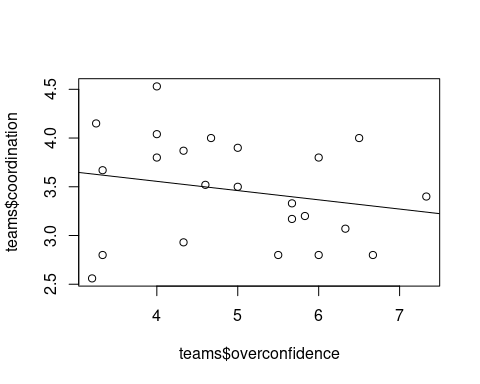
## [1] 0.6976965

H1: Team Overconfidence has a negative effect on team coordination

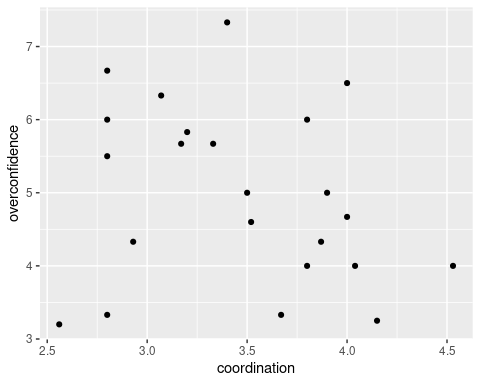
lm\_overconfidence\_coordination <- lm(formula = coordination ~ overconfidence, data = teams)  
rep.h1 <- summary(lm\_overconfidence\_coordination)  
  
print(rep.h1)

##   
## Call:  
## lm(formula = coordination ~ overconfidence, data = teams)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -1.07137 -0.38350 0.03929 0.43669 0.97448   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) 3.93477 0.48486 8.115 6.54e-08 \*\*\*  
## overconfidence -0.09481 0.09473 -1.001 0.328   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 0.5368 on 21 degrees of freedom  
## Multiple R-squared: 0.04553, Adjusted R-squared: 7.595e-05   
## F-statistic: 1.002 on 1 and 21 DF, p-value: 0.3283

plot(teams$coordination ~ teams$overconfidence, data = teams)  
abline(lm\_overconfidence\_coordination)



ggplot(teams, aes(x = coordination, y = overconfidence)) +  
 geom\_point()

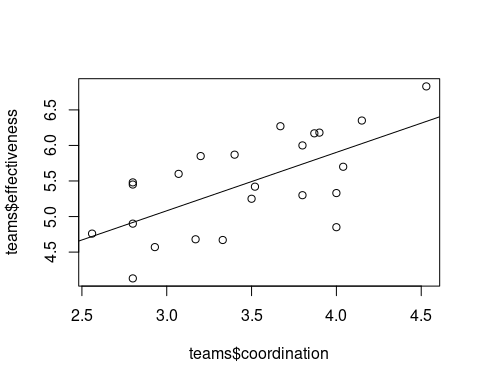


H2: Team Coordination has a positive effect on team effectiveness

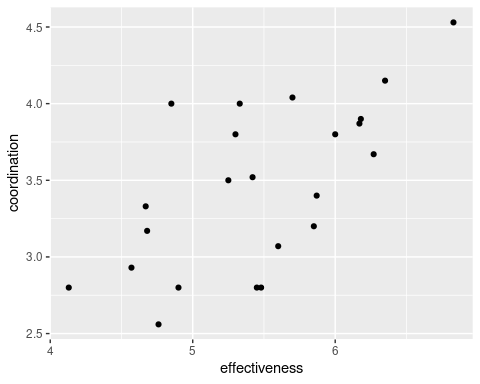
lm\_effectiveness\_coordination <- lm(formula = effectiveness ~ coordination, data = teams)  
rep.h2 <- summary(lm\_effectiveness\_coordination)  
print(rep.h2)

##   
## Call:  
## lm(formula = effectiveness ~ coordination, data = teams)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -1.05262 -0.44615 0.03993 0.46061 0.63838   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) 2.6177 0.7321 3.576 0.001784 \*\*   
## coordination 0.8212 0.2090 3.928 0.000771 \*\*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 0.5264 on 21 degrees of freedom  
## Multiple R-squared: 0.4236, Adjusted R-squared: 0.3961   
## F-statistic: 15.43 on 1 and 21 DF, p-value: 0.0007709

plot(teams$effectiveness ~ teams$coordination, data = teams)  
abline(lm\_effectiveness\_coordination)



ggplot(teams, aes(x = effectiveness, y = coordination)) +  
 geom\_point()

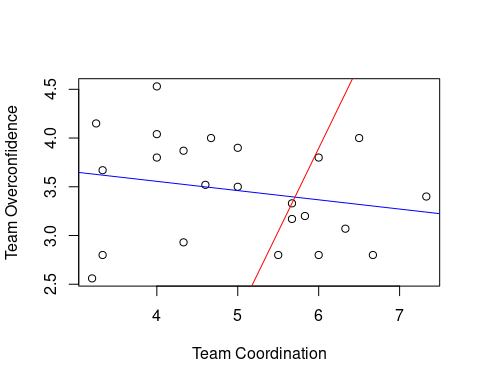
 H3: Voice Behavior has a moderator effect on the relationship between overconfidence and team coordination

inter <- teams$overconfidence \* teams$voice\_behavior  
teams\_voice\_interaction <- data.frame(teams, inter)  
lm\_voice\_coordination <- lm(formula = coordination ~ overconfidence + voice\_behavior + inter, data = teams\_voice\_interaction)  
rep.h3 <- summary(lm\_voice\_coordination)  
rep.h3

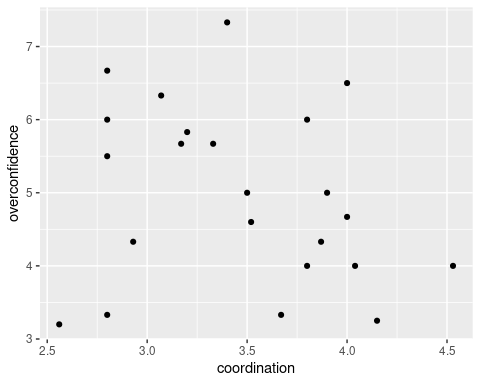
##   
## Call:  
## lm(formula = coordination ~ overconfidence + voice\_behavior +   
## inter, data = teams\_voice\_interaction)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -0.8892 -0.2471 -0.0404 0.3102 0.7715   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) -6.3579 3.8966 -1.632 0.1192   
## overconfidence 1.7089 0.7269 2.351 0.0297 \*  
## voice\_behavior 2.6272 0.9888 2.657 0.0156 \*  
## inter -0.4614 0.1846 -2.499 0.0218 \*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 0.4807 on 19 degrees of freedom  
## Multiple R-squared: 0.3075, Adjusted R-squared: 0.1982   
## F-statistic: 2.813 on 3 and 19 DF, p-value: 0.06707

plot(teams\_voice\_interaction$coordination ~ teams\_voice\_interaction$overconfidence, data = teams\_voice\_interaction, xlab = "Team Coordination", ylab = "Team Overconfidence")  
abline(lm(coordination ~ overconfidence, data = teams\_voice\_interaction), col = "blue")  
abline(lm\_voice\_coordination, col = "red")

## Warning in abline(lm\_voice\_coordination, col = "red"): only using the first two  
## of 4 regression coefficients



ggplot(teams\_voice\_interaction, aes(x = coordination, y = overconfidence)) +  
 geom\_point()

 H4: Team Coordination has a mediator effect on the relationship between overconfidence and team effectiveness

summary(lm(formula = effectiveness ~ overconfidence, data = teams))

##   
## Call:  
## lm(formula = effectiveness ~ overconfidence, data = teams)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -1.4125 -0.5073 0.0143 0.5566 1.3204   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) 5.70648 0.62380 9.148 9e-09 \*\*\*  
## overconfidence -0.04923 0.12188 -0.404 0.69   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 0.6906 on 21 degrees of freedom  
## Multiple R-squared: 0.00771, Adjusted R-squared: -0.03954   
## F-statistic: 0.1632 on 1 and 21 DF, p-value: 0.6903

summary(lm(formula = coordination ~ overconfidence, data = teams))

##   
## Call:  
## lm(formula = coordination ~ overconfidence, data = teams)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -1.07137 -0.38350 0.03929 0.43669 0.97448   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) 3.93477 0.48486 8.115 6.54e-08 \*\*\*  
## overconfidence -0.09481 0.09473 -1.001 0.328   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 0.5368 on 21 degrees of freedom  
## Multiple R-squared: 0.04553, Adjusted R-squared: 7.595e-05   
## F-statistic: 1.002 on 1 and 21 DF, p-value: 0.3283

summary(lm(formula = effectiveness ~ overconfidence + coordination, data = teams))

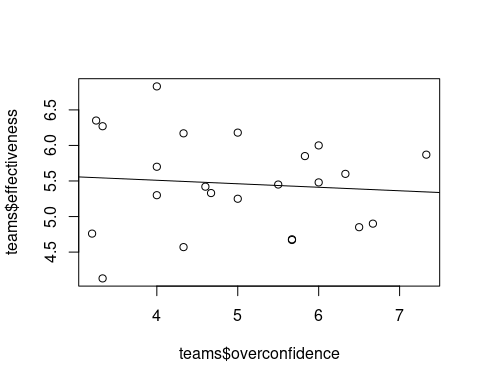
##   
## Call:  
## lm(formula = effectiveness ~ overconfidence + coordination, data = teams)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -1.1059 -0.4203 0.1063 0.4084 0.6849   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) 2.41851 0.98844 2.447 0.02378 \*   
## overconfidence 0.02999 0.09720 0.309 0.76082   
## coordination 0.83562 0.21874 3.820 0.00107 \*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 0.5381 on 20 degrees of freedom  
## Multiple R-squared: 0.4263, Adjusted R-squared: 0.3689   
## F-statistic: 7.431 on 2 and 20 DF, p-value: 0.003861

Hx1a: Team Overconfidence has a negative effect on team Effectiveness

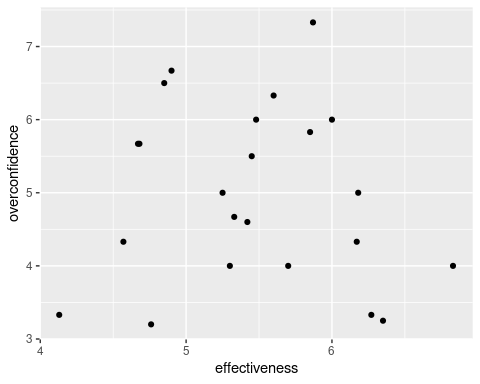
lm\_overconfidence\_effectiveness <- lm(formula = effectiveness ~ overconfidence, data = teams)  
rep.hx1a <- summary(lm\_overconfidence\_effectiveness)  
print(rep.hx1a)

##   
## Call:  
## lm(formula = effectiveness ~ overconfidence, data = teams)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -1.4125 -0.5073 0.0143 0.5566 1.3204   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) 5.70648 0.62380 9.148 9e-09 \*\*\*  
## overconfidence -0.04923 0.12188 -0.404 0.69   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 0.6906 on 21 degrees of freedom  
## Multiple R-squared: 0.00771, Adjusted R-squared: -0.03954   
## F-statistic: 0.1632 on 1 and 21 DF, p-value: 0.6903

plot(teams$effectiveness ~ teams$overconfidence, data = teams)  
abline(lm\_overconfidence\_effectiveness)



ggplot(teams, aes(x = effectiveness, y = overconfidence)) +  
 geom\_point()



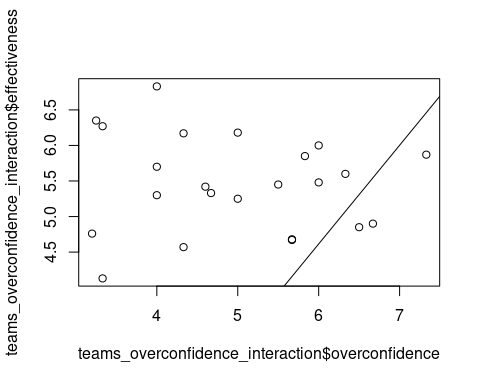
Hx1b: Team Overconfidence has a reverse effect on team Effectiveness mediated by team Coordination

inter2 <- teams$overconfidence \* teams$coordination  
teams\_overconfidence\_interaction <- data.frame(teams, inter2)  
  
lm\_overconfidence\_effectiveness\_coordination <- lm(formula = effectiveness ~ overconfidence + coordination + inter2, data = teams\_overconfidence\_interaction)  
rep.hx1b <- summary(lm\_overconfidence\_effectiveness\_coordination)  
print(rep.hx1b)

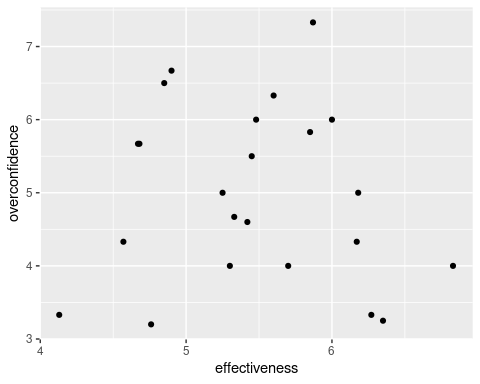
##   
## Call:  
## lm(formula = effectiveness ~ overconfidence + coordination +   
## inter2, data = teams\_overconfidence\_interaction)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -0.67371 -0.46438 -0.02151 0.43862 0.55177   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) -3.7121 2.7257 -1.362 0.18917   
## overconfidence 1.3878 0.5773 2.404 0.02658 \*   
## coordination 2.6678 0.7947 3.357 0.00331 \*\*  
## inter2 -0.4076 0.1713 -2.380 0.02796 \*   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 0.4846 on 19 degrees of freedom  
## Multiple R-squared: 0.558, Adjusted R-squared: 0.4882   
## F-statistic: 7.997 on 3 and 19 DF, p-value: 0.001197

plot(teams\_overconfidence\_interaction$effectiveness ~ teams\_overconfidence\_interaction$overconfidence, data = teams\_overconfidence\_interaction)  
abline(lm\_overconfidence\_effectiveness\_coordination)

## Warning in abline(lm\_overconfidence\_effectiveness\_coordination): only using the  
## first two of 4 regression coefficients



ggplot(teams\_overconfidence\_interaction, aes(x = effectiveness, y = overconfidence)) +  
 geom\_point()



eff\_survey <- subset(responses, select = c(eff\_q1, eff\_q2, eff\_q3, eff\_q4, eff\_q5, eff\_q6, eff\_q7, eff\_q8, eff\_q9, eff\_q10))  
coord\_survey <- subset(responses, select = c(coord\_q1, coord\_q2, coord\_q3, coord\_q4, coord\_q5))  
voice\_survey <- subset(responses, select = c(voice\_q1, voice\_q2, voice\_q3, voice\_q4, voice\_q5, voice\_q6))  
ovconf\_survey <- subset(responses, select = c(ovconf\_q1h, ovconf\_q1l, ovconf\_q2h, ovconf\_q2l, ovconf\_q3h, ovconf\_q3l, ovconf\_q4h, ovconf\_q4l, ovconf\_q5h, ovconf\_q5l, ovconf\_q6h, ovconf\_q6l, ovconf\_q7h, ovconf\_q7l, ovconf\_q8h, ovconf\_q8l, ovconf\_q9h, ovconf\_q9l, ovconf\_q10h, ovconf\_q10l))

Cronbach’s Alpha is used to determine the reliability of the survey used for each variable.

cronbach.alpha(eff\_survey, CI = TRUE)

##   
## Cronbach's alpha for the 'eff\_survey' data-set  
##   
## Items: 10  
## Sample units: 79  
## alpha: 0.823  
##   
## Bootstrap 95% CI based on 1000 samples  
## 2.5% 97.5%   
## 0.707 0.887

commit\_survey <- eff\_survey[1:5]  
cronbach.alpha(commit\_survey, CI = TRUE)

##   
## Cronbach's alpha for the 'commit\_survey' data-set  
##   
## Items: 5  
## Sample units: 79  
## alpha: 0.728  
##   
## Bootstrap 95% CI based on 1000 samples  
## 2.5% 97.5%   
## 0.507 0.851

perf\_survey <- eff\_survey[6:10]  
cronbach.alpha(perf\_survey, CI = TRUE)

##   
## Cronbach's alpha for the 'perf\_survey' data-set  
##   
## Items: 5  
## Sample units: 79  
## alpha: 0.753  
##   
## Bootstrap 95% CI based on 1000 samples  
## 2.5% 97.5%   
## 0.631 0.829

cronbach.alpha(coord\_survey, CI = TRUE)

##   
## Cronbach's alpha for the 'coord\_survey' data-set  
##   
## Items: 5  
## Sample units: 79  
## alpha: 0.67  
##   
## Bootstrap 95% CI based on 1000 samples  
## 2.5% 97.5%   
## 0.502 0.788

cronbach.alpha(voice\_survey, CI = TRUE)

##   
## Cronbach's alpha for the 'voice\_survey' data-set  
##   
## Items: 6  
## Sample units: 79  
## alpha: 0.85  
##   
## Bootstrap 95% CI based on 1000 samples  
## 2.5% 97.5%   
## 0.788 0.891

cronbach.alpha(ovconf\_survey, CI = TRUE)

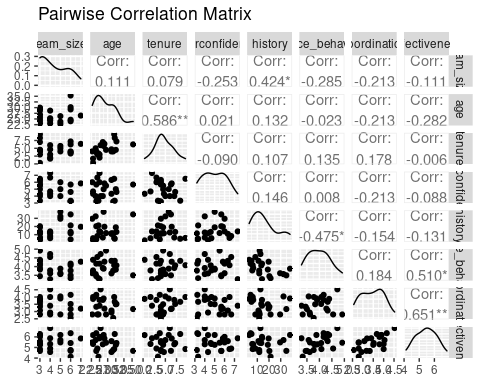
##   
## Cronbach's alpha for the 'ovconf\_survey' data-set  
##   
## Items: 20  
## Sample units: 79  
## alpha: 0.607  
##   
## Bootstrap 95% CI based on 1000 samples  
## 2.5% 97.5%   
## 0.219 0.757

core\_data <- subset(teams, select = -c(team, org, response\_rate, response\_count))

final\_model <- lm(effectiveness ~ ., data = core\_data)  
extract\_eq(final\_model, wrap = TRUE, use\_coefs = TRUE)

$$
\begin{aligned}
\operatorname{\widehat{effectiveness}} &= -0.49 + 0.06(\operatorname{team\\_size}) - 0.02(\operatorname{age}) - 0.06(\operatorname{tenure})\ + \\
&\quad 0.02(\operatorname{overconfidence}) + 0.01(\operatorname{history}) + 0.83(\operatorname{voice\\_behavior}) + 0.8(\operatorname{coordination})
\end{aligned}
$$

ggpairs(core\_data, progress = FALSE, title = "Pairwise Correlation Matrix")



full\_lm <- lm(effectiveness ~ ., data = core\_data)  
print(summary(full\_lm))

##   
## Call:  
## lm(formula = effectiveness ~ ., data = core\_data)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -0.62854 -0.22927 -0.03915 0.16603 0.86074   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) -0.49250 2.01881 -0.244 0.81057   
## team\_size 0.06384 0.09287 0.687 0.50230   
## age -0.01548 0.04384 -0.353 0.72891   
## tenure -0.05607 0.06438 -0.871 0.39754   
## overconfidence 0.01759 0.09439 0.186 0.85467   
## history 0.01310 0.01287 1.018 0.32502   
## voice\_behavior 0.83127 0.26915 3.088 0.00749 \*\*  
## coordination 0.79609 0.22088 3.604 0.00260 \*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 0.4735 on 15 degrees of freedom  
## Multiple R-squared: 0.6668, Adjusted R-squared: 0.5113   
## F-statistic: 4.289 on 7 and 15 DF, p-value: 0.008611

core\_data\_except\_overconfidence <- subset(core\_data, select = -c(overconfidence))  
all\_except\_overconfidence <- lm(effectiveness ~ ., data = core\_data\_except\_overconfidence)  
print(summary(all\_except\_overconfidence))

##   
## Call:  
## lm(formula = effectiveness ~ ., data = core\_data\_except\_overconfidence)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -0.59581 -0.23279 -0.03367 0.15673 0.90227   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) -0.37168 1.85330 -0.201 0.84358   
## team\_size 0.05719 0.08310 0.688 0.50121   
## age -0.01540 0.04249 -0.362 0.72179   
## tenure -0.05675 0.06231 -0.911 0.37587   
## history 0.01381 0.01191 1.160 0.26313   
## voice\_behavior 0.83637 0.25955 3.222 0.00532 \*\*  
## coordination 0.78602 0.20762 3.786 0.00162 \*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 0.459 on 16 degrees of freedom  
## Multiple R-squared: 0.6661, Adjusted R-squared: 0.5408   
## F-statistic: 5.319 on 6 and 16 DF, p-value: 0.003449

core\_data\_except\_coordination <- subset(core\_data, select = -c(coordination))  
all\_except\_coordination <- lm(effectiveness ~ ., data = core\_data\_except\_coordination)  
print(summary(all\_except\_coordination))

##   
## Call:  
## lm(formula = effectiveness ~ ., data = core\_data\_except\_coordination)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -1.02281 -0.36840 0.09421 0.33216 1.15332   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) 3.94306 2.11665 1.863 0.0809 .  
## team\_size -0.01723 0.11917 -0.145 0.8868   
## age -0.07396 0.05386 -1.373 0.1886   
## tenure 0.02619 0.07962 0.329 0.7464   
## overconfidence -0.06557 0.12106 -0.542 0.5955   
## history 0.01427 0.01702 0.838 0.4142   
## voice\_behavior 0.89026 0.35533 2.505 0.0234 \*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 0.6263 on 16 degrees of freedom  
## Multiple R-squared: 0.3783, Adjusted R-squared: 0.1452   
## F-statistic: 1.623 on 6 and 16 DF, p-value: 0.2048

core\_data\_except\_voice\_behavior <- subset(core\_data, select = -c(voice\_behavior))  
all\_except\_voice\_behavior <- lm(effectiveness ~ ., data = core\_data\_except\_voice\_behavior)  
print(summary(all\_except\_voice\_behavior))

##   
## Call:  
## lm(formula = effectiveness ~ ., data = core\_data\_except\_voice\_behavior)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -0.9608 -0.3387 0.0967 0.4294 0.8673   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) 2.926057 2.090840 1.399 0.18076   
## team\_size 0.047799 0.114829 0.416 0.68275   
## age -0.025175 0.054148 -0.465 0.64825   
## tenure -0.015705 0.078070 -0.201 0.84310   
## overconfidence 0.047276 0.116287 0.407 0.68972   
## history -0.004059 0.014377 -0.282 0.78129   
## coordination 0.837574 0.273034 3.068 0.00736 \*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 0.5864 on 16 degrees of freedom  
## Multiple R-squared: 0.455, Adjusted R-squared: 0.2506   
## F-statistic: 2.226 on 6 and 16 DF, p-value: 0.09416

core\_data\_except\_history <- subset(core\_data, select = -c(history))  
all\_except\_history <- lm(effectiveness ~ ., data = core\_data\_except\_history)  
print(summary(all\_except\_history))

##   
## Call:  
## lm(formula = effectiveness ~ ., data = core\_data\_except\_history)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -0.78325 -0.16354 0.01271 0.13269 0.81803   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) -0.17433 1.99666 -0.087 0.93151   
## team\_size 0.10072 0.08560 1.177 0.25657   
## age -0.01595 0.04388 -0.363 0.72108   
## tenure -0.04642 0.06375 -0.728 0.47703   
## overconfidence 0.04624 0.09019 0.513 0.61522   
## voice\_behavior 0.71306 0.24306 2.934 0.00974 \*\*  
## coordination 0.80175 0.22105 3.627 0.00227 \*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 0.474 on 16 degrees of freedom  
## Multiple R-squared: 0.6438, Adjusted R-squared: 0.5103   
## F-statistic: 4.82 on 6 and 16 DF, p-value: 0.005457

core\_data\_except\_tenure <- subset(core\_data, select = -c(tenure))  
all\_except\_tenure <- lm(effectiveness ~ ., data = core\_data\_except\_tenure)  
print(summary(all\_except\_tenure))

##   
## Call:  
## lm(formula = effectiveness ~ ., data = core\_data\_except\_tenure)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -0.81388 -0.18447 0.03224 0.19101 0.92059   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) 0.34513 1.76152 0.196 0.84714   
## team\_size 0.05901 0.09200 0.641 0.53031   
## age -0.04003 0.03332 -1.202 0.24703   
## overconfidence 0.02229 0.09352 0.238 0.81460   
## history 0.01145 0.01263 0.906 0.37838   
## voice\_behavior 0.78368 0.26155 2.996 0.00855 \*\*  
## coordination 0.72789 0.20497 3.551 0.00266 \*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 0.4699 on 16 degrees of freedom  
## Multiple R-squared: 0.65, Adjusted R-squared: 0.5187   
## F-statistic: 4.952 on 6 and 16 DF, p-value: 0.004823

core\_data\_except\_age <- subset(core\_data, select = -c(age))  
all\_except\_age <- lm(effectiveness ~ ., data = core\_data\_except\_age)  
print(summary(all\_except\_age))

##   
## Call:  
## lm(formula = effectiveness ~ ., data = core\_data\_except\_age)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -0.61751 -0.21310 -0.02139 0.16785 0.85367   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) -0.96501 1.46974 -0.657 0.520781   
## team\_size 0.06461 0.09027 0.716 0.484427   
## tenure -0.07069 0.04794 -1.475 0.159714   
## overconfidence 0.01726 0.09177 0.188 0.853173   
## history 0.01314 0.01251 1.050 0.309120   
## voice\_behavior 0.83807 0.26101 3.211 0.005452 \*\*   
## coordination 0.82496 0.19950 4.135 0.000777 \*\*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 0.4604 on 16 degrees of freedom  
## Multiple R-squared: 0.6641, Adjusted R-squared: 0.5381   
## F-statistic: 5.271 on 6 and 16 DF, p-value: 0.003599

core\_data\_except\_team\_size <- subset(core\_data, select = -c(team\_size))  
all\_except\_team\_size <- lm(effectiveness ~ ., data = core\_data\_except\_team\_size)  
print(summary(all\_except\_team\_size))

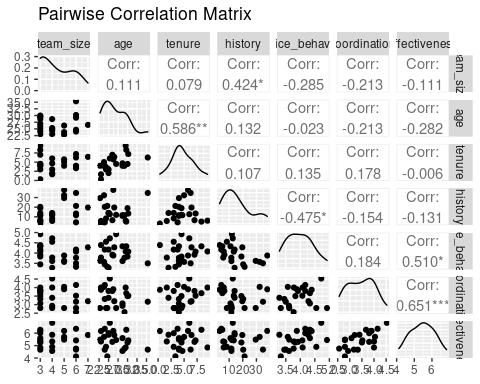
##   
## Call:  
## lm(formula = effectiveness ~ ., data = core\_data\_except\_team\_size)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -0.63126 -0.24063 -0.02852 0.21967 0.90123   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) 0.028413 1.840108 0.015 0.98787   
## age -0.016190 0.043096 -0.376 0.71209   
## tenure -0.053427 0.063198 -0.845 0.41036   
## overconfidence -0.007364 0.085684 -0.086 0.93258   
## history 0.016548 0.011653 1.420 0.17476   
## voice\_behavior 0.820917 0.264264 3.106 0.00679 \*\*  
## coordination 0.759307 0.210741 3.603 0.00238 \*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 0.4656 on 16 degrees of freedom  
## Multiple R-squared: 0.6563, Adjusted R-squared: 0.5275   
## F-statistic: 5.093 on 6 and 16 DF, p-value: 0.004234

core\_data <- subset(core\_data, select = -c(overconfidence))

final\_model <- lm(effectiveness ~ ., data = core\_data)  
extract\_eq(final\_model, wrap = TRUE, use\_coefs = TRUE)

$$
\begin{aligned}
\operatorname{\widehat{effectiveness}} &= -0.37 + 0.06(\operatorname{team\\_size}) - 0.02(\operatorname{age}) - 0.06(\operatorname{tenure})\ + \\
&\quad 0.01(\operatorname{history}) + 0.84(\operatorname{voice\\_behavior}) + 0.79(\operatorname{coordination})
\end{aligned}
$$

ggpairs(core\_data, progress = FALSE, title = "Pairwise Correlation Matrix")



full\_lm <- lm(effectiveness ~ ., data = core\_data)  
print(summary(full\_lm))

##   
## Call:  
## lm(formula = effectiveness ~ ., data = core\_data)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -0.59581 -0.23279 -0.03367 0.15673 0.90227   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) -0.37168 1.85330 -0.201 0.84358   
## team\_size 0.05719 0.08310 0.688 0.50121   
## age -0.01540 0.04249 -0.362 0.72179   
## tenure -0.05675 0.06231 -0.911 0.37587   
## history 0.01381 0.01191 1.160 0.26313   
## voice\_behavior 0.83637 0.25955 3.222 0.00532 \*\*  
## coordination 0.78602 0.20762 3.786 0.00162 \*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 0.459 on 16 degrees of freedom  
## Multiple R-squared: 0.6661, Adjusted R-squared: 0.5408   
## F-statistic: 5.319 on 6 and 16 DF, p-value: 0.003449

core\_data\_except\_coordination <- subset(core\_data, select = -c(coordination))  
all\_except\_coordination <- lm(effectiveness ~ ., data = core\_data\_except\_coordination)  
print(summary(all\_except\_coordination))

##   
## Call:  
## lm(formula = effectiveness ~ ., data = core\_data\_except\_coordination)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -1.09496 -0.31082 0.02896 0.34751 1.00334   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) 3.686304 2.019551 1.825 0.0856 .  
## team\_size 0.005092 0.109471 0.047 0.9634   
## age -0.077211 0.052401 -1.473 0.1589   
## tenure 0.033039 0.076961 0.429 0.6731   
## history 0.011489 0.015885 0.723 0.4794   
## voice\_behavior 0.872970 0.346460 2.520 0.0220 \*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 0.6131 on 17 degrees of freedom  
## Multiple R-squared: 0.3669, Adjusted R-squared: 0.1807   
## F-statistic: 1.97 on 5 and 17 DF, p-value: 0.1351

core\_data\_except\_voice\_behavior <- subset(core\_data, select = -c(voice\_behavior))  
all\_except\_voice\_behavior <- lm(effectiveness ~ ., data = core\_data\_except\_voice\_behavior)  
print(summary(all\_except\_voice\_behavior))

##   
## Call:  
## lm(formula = effectiveness ~ ., data = core\_data\_except\_voice\_behavior)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -0.90144 -0.34809 0.02491 0.43369 0.79225   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) 3.311244 1.817518 1.822 0.0861 .   
## team\_size 0.029456 0.102969 0.286 0.7783   
## age -0.025118 0.052802 -0.476 0.6403   
## tenure -0.016897 0.076076 -0.222 0.8269   
## history -0.002403 0.013445 -0.179 0.8603   
## coordination 0.810941 0.258470 3.137 0.0060 \*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 0.5718 on 17 degrees of freedom  
## Multiple R-squared: 0.4493, Adjusted R-squared: 0.2874   
## F-statistic: 2.774 on 5 and 17 DF, p-value: 0.05208

core\_data\_except\_history <- subset(core\_data, select = -c(history))  
all\_except\_history <- lm(effectiveness ~ ., data = core\_data\_except\_history)  
print(summary(all\_except\_history))

##   
## Call:  
## lm(formula = effectiveness ~ ., data = core\_data\_except\_history)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -0.71318 -0.16321 -0.01143 0.18738 0.82834   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) 0.22441 1.79861 0.125 0.90217   
## team\_size 0.08733 0.07973 1.095 0.28867   
## age -0.01579 0.04292 -0.368 0.71754   
## tenure -0.04688 0.06235 -0.752 0.46235   
## voice\_behavior 0.70917 0.23762 2.985 0.00833 \*\*  
## coordination 0.77362 0.20944 3.694 0.00180 \*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 0.4636 on 17 degrees of freedom  
## Multiple R-squared: 0.638, Adjusted R-squared: 0.5315   
## F-statistic: 5.992 on 5 and 17 DF, p-value: 0.00226

core\_data\_except\_tenure <- subset(core\_data, select = -c(tenure))  
all\_except\_tenure <- lm(effectiveness ~ ., data = core\_data\_except\_tenure)  
print(summary(all\_except\_tenure))

##   
## Call:  
## lm(formula = effectiveness ~ ., data = core\_data\_except\_tenure)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -0.77514 -0.20528 0.02038 0.17158 0.97433   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) 0.51182 1.57131 0.326 0.74861   
## team\_size 0.05048 0.08236 0.613 0.54806   
## age -0.04031 0.03236 -1.246 0.22976   
## history 0.01233 0.01174 1.050 0.30821   
## voice\_behavior 0.78944 0.25311 3.119 0.00625 \*\*  
## coordination 0.71403 0.19102 3.738 0.00164 \*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 0.4567 on 17 degrees of freedom  
## Multiple R-squared: 0.6487, Adjusted R-squared: 0.5454   
## F-statistic: 6.279 on 5 and 17 DF, p-value: 0.001786

core\_data\_except\_age <- subset(core\_data, select = -c(age))  
all\_except\_age <- lm(effectiveness ~ ., data = core\_data\_except\_age)  
print(summary(all\_except\_age))

##   
## Call:  
## lm(formula = effectiveness ~ ., data = core\_data\_except\_age)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -0.58544 -0.21699 -0.03302 0.16233 0.89446   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) -0.84402 1.28346 -0.658 0.519593   
## team\_size 0.05808 0.08091 0.718 0.482639   
## tenure -0.07129 0.04645 -1.535 0.143280   
## history 0.01385 0.01160 1.194 0.249017   
## voice\_behavior 0.84305 0.25219 3.343 0.003856 \*\*   
## coordination 0.81494 0.18672 4.364 0.000422 \*\*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 0.4471 on 17 degrees of freedom  
## Multiple R-squared: 0.6633, Adjusted R-squared: 0.5643   
## F-statistic: 6.698 on 5 and 17 DF, p-value: 0.001282

core\_data\_except\_team\_size <- subset(core\_data, select = -c(team\_size))  
all\_except\_team\_size <- lm(effectiveness ~ ., data = core\_data\_except\_team\_size)  
print(summary(all\_except\_team\_size))

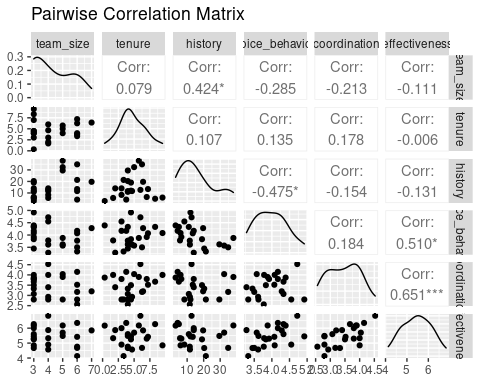
##   
## Call:  
## lm(formula = effectiveness ~ ., data = core\_data\_except\_team\_size)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -0.64748 -0.24150 -0.02411 0.22325 0.88290   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) -0.004267 1.747035 -0.002 0.99808   
## age -0.016266 0.041810 -0.389 0.70207   
## tenure -0.052954 0.061093 -0.867 0.39813   
## history 0.016374 0.011134 1.471 0.15967   
## voice\_behavior 0.817878 0.254126 3.218 0.00504 \*\*  
## coordination 0.762367 0.201558 3.782 0.00149 \*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 0.4518 on 17 degrees of freedom  
## Multiple R-squared: 0.6562, Adjusted R-squared: 0.555   
## F-statistic: 6.489 on 5 and 17 DF, p-value: 0.001511

core\_data <- subset(core\_data, select = -c(age))

final\_model <- lm(effectiveness ~ ., data = core\_data)  
extract\_eq(final\_model, wrap = TRUE, use\_coefs = TRUE)

$$
\begin{aligned}
\operatorname{\widehat{effectiveness}} &= -0.84 + 0.06(\operatorname{team\\_size}) - 0.07(\operatorname{tenure}) + 0.01(\operatorname{history})\ + \\
&\quad 0.84(\operatorname{voice\\_behavior}) + 0.81(\operatorname{coordination})
\end{aligned}
$$

ggpairs(core\_data, progress = FALSE, title = "Pairwise Correlation Matrix")



full\_lm <- lm(effectiveness ~ ., data = core\_data)  
print(summary(full\_lm))

##   
## Call:  
## lm(formula = effectiveness ~ ., data = core\_data)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -0.58544 -0.21699 -0.03302 0.16233 0.89446   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) -0.84402 1.28346 -0.658 0.519593   
## team\_size 0.05808 0.08091 0.718 0.482639   
## tenure -0.07129 0.04645 -1.535 0.143280   
## history 0.01385 0.01160 1.194 0.249017   
## voice\_behavior 0.84305 0.25219 3.343 0.003856 \*\*   
## coordination 0.81494 0.18672 4.364 0.000422 \*\*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 0.4471 on 17 degrees of freedom  
## Multiple R-squared: 0.6633, Adjusted R-squared: 0.5643   
## F-statistic: 6.698 on 5 and 17 DF, p-value: 0.001282

core\_data\_except\_coordination <- subset(core\_data, select = -c(coordination))  
all\_except\_coordination <- lm(effectiveness ~ ., data = core\_data\_except\_coordination)  
print(summary(all\_except\_coordination))

##   
## Call:  
## lm(formula = effectiveness ~ ., data = core\_data\_except\_coordination)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -1.06289 -0.46376 0.06147 0.38072 0.97927   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) 1.7857442 1.6037247 1.113 0.2801   
## team\_size -0.0009279 0.1128976 -0.008 0.9935   
## tenure -0.0330196 0.0645573 -0.511 0.6152   
## history 0.0111862 0.0163923 0.682 0.5037   
## voice\_behavior 0.9201626 0.3560216 2.585 0.0187 \*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 0.6328 on 18 degrees of freedom  
## Multiple R-squared: 0.2861, Adjusted R-squared: 0.1274   
## F-statistic: 1.803 on 4 and 18 DF, p-value: 0.1723

core\_data\_except\_voice\_behavior <- subset(core\_data, select = -c(voice\_behavior))  
all\_except\_voice\_behavior <- lm(effectiveness ~ ., data = core\_data\_except\_voice\_behavior)  
print(summary(all\_except\_voice\_behavior))

##   
## Call:  
## lm(formula = effectiveness ~ ., data = core\_data\_except\_voice\_behavior)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -0.86416 -0.38862 -0.01612 0.44893 0.78961   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) 2.58509 0.96506 2.679 0.0153 \*   
## team\_size 0.03056 0.10071 0.303 0.7650   
## tenure -0.04020 0.05694 -0.706 0.4892   
## history -0.00256 0.01315 -0.195 0.8478   
## coordination 0.85866 0.23303 3.685 0.0017 \*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 0.5594 on 18 degrees of freedom  
## Multiple R-squared: 0.442, Adjusted R-squared: 0.318   
## F-statistic: 3.565 on 4 and 18 DF, p-value: 0.02611

core\_data\_except\_history <- subset(core\_data, select = -c(history))  
all\_except\_history <- lm(effectiveness ~ ., data = core\_data\_except\_history)  
print(summary(all\_except\_history))

##   
## Call:  
## lm(formula = effectiveness ~ ., data = core\_data\_except\_history)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -0.7028 -0.2035 -0.0311 0.1975 0.8202   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) -0.25836 1.19988 -0.215 0.831940   
## team\_size 0.08832 0.07775 1.136 0.270874   
## tenure -0.06176 0.04630 -1.334 0.198876   
## voice\_behavior 0.71569 0.23119 3.096 0.006238 \*\*   
## coordination 0.80323 0.18865 4.258 0.000473 \*\*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 0.4524 on 18 degrees of freedom  
## Multiple R-squared: 0.6351, Adjusted R-squared: 0.554   
## F-statistic: 7.832 on 4 and 18 DF, p-value: 0.0007703

core\_data\_except\_tenure <- subset(core\_data, select = -c(tenure))  
all\_except\_tenure <- lm(effectiveness ~ ., data = core\_data\_except\_tenure)  
print(summary(all\_except\_tenure))

##   
## Call:  
## lm(formula = effectiveness ~ ., data = core\_data\_except\_tenure)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -0.9340 -0.2412 -0.1023 0.2372 1.0219   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) -0.58800 1.31960 -0.446 0.661209   
## team\_size 0.04679 0.08356 0.560 0.582410   
## history 0.01079 0.01185 0.910 0.374719   
## voice\_behavior 0.76557 0.25622 2.988 0.007890 \*\*   
## coordination 0.76085 0.19014 4.002 0.000837 \*\*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 0.4636 on 18 degrees of freedom  
## Multiple R-squared: 0.6167, Adjusted R-squared: 0.5315   
## F-statistic: 7.239 on 4 and 18 DF, p-value: 0.00117

core\_data\_except\_team\_size <- subset(core\_data, select = -c(team\_size))  
all\_except\_team\_size <- lm(effectiveness ~ ., data = core\_data\_except\_team\_size)  
print(summary(all\_except\_team\_size))

##   
## Call:  
## lm(formula = effectiveness ~ ., data = core\_data\_except\_team\_size)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -0.63737 -0.29321 -0.04652 0.19393 0.87433   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) -0.49758 1.17312 -0.424 0.676485   
## tenure -0.06826 0.04563 -1.496 0.152049   
## history 0.01645 0.01087 1.514 0.147395   
## voice\_behavior 0.82463 0.24748 3.332 0.003709 \*\*   
## coordination 0.79254 0.18160 4.364 0.000374 \*\*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 0.4411 on 18 degrees of freedom  
## Multiple R-squared: 0.6531, Adjusted R-squared: 0.576   
## F-statistic: 8.473 on 4 and 18 DF, p-value: 0.0005002

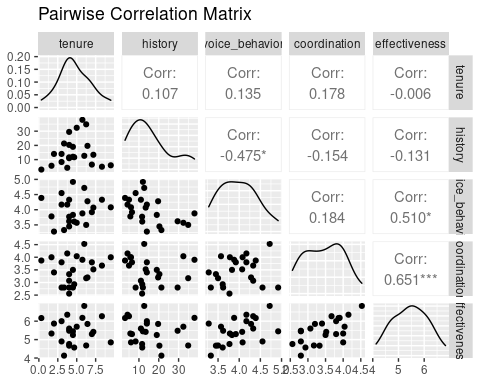
Team Size seems to have the least correlation with the Effectiveness, so it is eliminated.

core\_data <- subset(core\_data, select = -c(team\_size))  
  
optimal\_subset <- core\_data

final\_model <- lm(effectiveness ~ ., data = core\_data)  
extract\_eq(final\_model, wrap = TRUE, use\_coefs = TRUE)

$$
\begin{aligned}
\operatorname{\widehat{effectiveness}} &= -0.5 - 0.07(\operatorname{tenure}) + 0.02(\operatorname{history}) + 0.82(\operatorname{voice\\_behavior})\ + \\
&\quad 0.79(\operatorname{coordination})
\end{aligned}
$$

ggpairs(core\_data, progress = FALSE, title = "Pairwise Correlation Matrix")



full\_lm <- lm(effectiveness ~ ., data = core\_data)  
print(summary(full\_lm))

##   
## Call:  
## lm(formula = effectiveness ~ ., data = core\_data)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -0.63737 -0.29321 -0.04652 0.19393 0.87433   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) -0.49758 1.17312 -0.424 0.676485   
## tenure -0.06826 0.04563 -1.496 0.152049   
## history 0.01645 0.01087 1.514 0.147395   
## voice\_behavior 0.82463 0.24748 3.332 0.003709 \*\*   
## coordination 0.79254 0.18160 4.364 0.000374 \*\*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 0.4411 on 18 degrees of freedom  
## Multiple R-squared: 0.6531, Adjusted R-squared: 0.576   
## F-statistic: 8.473 on 4 and 18 DF, p-value: 0.0005002

core\_data\_except\_coordination <- subset(core\_data, select = -c(coordination))  
all\_except\_coordination <- lm(effectiveness ~ ., data = core\_data\_except\_coordination)  
print(summary(all\_except\_coordination))

##   
## Call:  
## lm(formula = effectiveness ~ ., data = core\_data\_except\_coordination)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -1.06317 -0.46415 0.06129 0.38104 0.97964   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) 1.78124 1.46690 1.214 0.240   
## tenure -0.03305 0.06272 -0.527 0.604   
## history 0.01114 0.01508 0.739 0.469   
## voice\_behavior 0.92050 0.34421 2.674 0.015 \*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 0.6159 on 19 degrees of freedom  
## Multiple R-squared: 0.2861, Adjusted R-squared: 0.1733   
## F-statistic: 2.538 on 3 and 19 DF, p-value: 0.08724

core\_data\_except\_voice\_behavior <- subset(core\_data, select = -c(voice\_behavior))  
all\_except\_voice\_behavior <- lm(effectiveness ~ ., data = core\_data\_except\_voice\_behavior)  
print(summary(all\_except\_voice\_behavior))

##   
## Call:  
## lm(formula = effectiveness ~ ., data = core\_data\_except\_voice\_behavior)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -0.88853 -0.40587 0.03136 0.42534 0.76418   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) 2.7294401 0.8193399 3.331 0.00351 \*\*  
## tenure -0.0389490 0.0554180 -0.703 0.49069   
## history -0.0009833 0.0117871 -0.083 0.93439   
## coordination 0.8462506 0.2238636 3.780 0.00127 \*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 0.5459 on 19 degrees of freedom  
## Multiple R-squared: 0.4391, Adjusted R-squared: 0.3506   
## F-statistic: 4.959 on 3 and 19 DF, p-value: 0.01042

core\_data\_except\_history <- subset(core\_data, select = -c(history))  
all\_except\_history <- lm(effectiveness ~ ., data = core\_data\_except\_history)  
print(summary(all\_except\_history))

##   
## Call:  
## lm(formula = effectiveness ~ ., data = core\_data\_except\_history)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -0.82767 -0.25254 -0.00891 0.18329 0.76261   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) 0.51162 0.99762 0.513 0.613972   
## tenure -0.05362 0.04609 -1.163 0.259071   
## voice\_behavior 0.64421 0.22416 2.874 0.009719 \*\*   
## coordination 0.76176 0.18649 4.085 0.000631 \*\*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 0.4558 on 19 degrees of freedom  
## Multiple R-squared: 0.6089, Adjusted R-squared: 0.5472   
## F-statistic: 9.862 on 3 and 19 DF, p-value: 0.0003884

core\_data\_except\_tenure <- subset(core\_data, select = -c(tenure))  
all\_except\_tenure <- lm(effectiveness ~ ., data = core\_data\_except\_tenure)  
print(summary(all\_except\_tenure))

##   
## Call:  
## lm(formula = effectiveness ~ ., data = core\_data\_except\_tenure)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -0.9642 -0.2525 -0.1032 0.2415 1.0011   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) -0.31542 1.20418 -0.262 0.796190   
## history 0.01301 0.01096 1.187 0.249904   
## voice\_behavior 0.75329 0.25063 3.006 0.007271 \*\*   
## coordination 0.74453 0.18447 4.036 0.000706 \*\*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 0.4552 on 19 degrees of freedom  
## Multiple R-squared: 0.61, Adjusted R-squared: 0.5484   
## F-statistic: 9.906 on 3 and 19 DF, p-value: 0.0003788

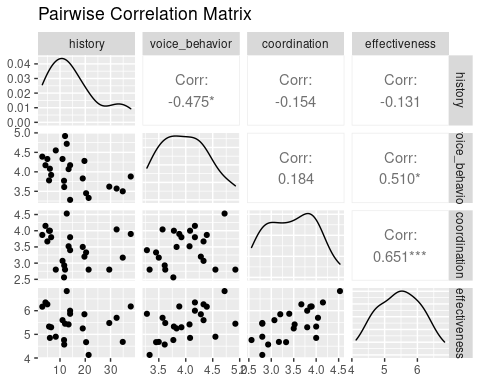
The elimination of either History or Tenure seems to reduce the goodness of fit of the model. However, eliminating tenure has less negative effect on the model, so it is excluded.

core\_data <- subset(core\_data, select = -c(tenure))

final\_model <- lm(effectiveness ~ ., data = core\_data)  
extract\_eq(final\_model, wrap = TRUE, use\_coefs = TRUE)

$$
\begin{aligned}
\operatorname{\widehat{effectiveness}} &= -0.32 + 0.01(\operatorname{history}) + 0.75(\operatorname{voice\\_behavior}) + 0.74(\operatorname{coordination})
\end{aligned}
$$

ggpairs(core\_data, progress = FALSE, title = "Pairwise Correlation Matrix")



full\_lm <- lm(effectiveness ~ ., data = core\_data)  
print(summary(full\_lm))

##   
## Call:  
## lm(formula = effectiveness ~ ., data = core\_data)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -0.9642 -0.2525 -0.1032 0.2415 1.0011   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) -0.31542 1.20418 -0.262 0.796190   
## history 0.01301 0.01096 1.187 0.249904   
## voice\_behavior 0.75329 0.25063 3.006 0.007271 \*\*   
## coordination 0.74453 0.18447 4.036 0.000706 \*\*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 0.4552 on 19 degrees of freedom  
## Multiple R-squared: 0.61, Adjusted R-squared: 0.5484   
## F-statistic: 9.906 on 3 and 19 DF, p-value: 0.0003788

core\_data\_except\_coordination <- subset(core\_data, select = -c(coordination))  
all\_except\_coordination <- lm(effectiveness ~ ., data = core\_data\_except\_coordination)  
print(summary(all\_except\_coordination))

##   
## Call:  
## lm(formula = effectiveness ~ ., data = core\_data\_except\_coordination)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -0.99590 -0.50411 -0.02275 0.45202 1.03983   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) 1.803285 1.439580 1.253 0.2248   
## history 0.009582 0.014516 0.660 0.5167   
## voice\_behavior 0.881934 0.330215 2.671 0.0147 \*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 0.6047 on 20 degrees of freedom  
## Multiple R-squared: 0.2756, Adjusted R-squared: 0.2032   
## F-statistic: 3.805 on 2 and 20 DF, p-value: 0.03978

core\_data\_except\_voice\_behavior <- subset(core\_data, select = -c(voice\_behavior))  
all\_except\_voice\_behavior <- lm(effectiveness ~ ., data = core\_data\_except\_voice\_behavior)  
print(summary(all\_except\_voice\_behavior))

##   
## Call:  
## lm(formula = effectiveness ~ ., data = core\_data\_except\_voice\_behavior)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -1.06932 -0.46020 0.02627 0.45303 0.61752   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) 2.67193 0.80486 3.320 0.00342 \*\*  
## history -0.00213 0.01153 -0.185 0.85524   
## coordination 0.81504 0.21662 3.763 0.00123 \*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 0.5389 on 20 degrees of freedom  
## Multiple R-squared: 0.4246, Adjusted R-squared: 0.367   
## F-statistic: 7.378 on 2 and 20 DF, p-value: 0.003981

core\_data\_except\_history <- subset(core\_data, select = -c(history))  
all\_except\_history <- lm(effectiveness ~ ., data = core\_data\_except\_history)  
print(summary(all\_except\_history))

##   
## Call:  
## lm(formula = effectiveness ~ ., data = core\_data\_except\_history)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -1.06368 -0.32158 0.07167 0.24025 0.88613   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) 0.4877 1.0062 0.485 0.633136   
## voice\_behavior 0.6166 0.2249 2.742 0.012562 \*   
## coordination 0.7276 0.1858 3.916 0.000856 \*\*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 0.4598 on 20 degrees of freedom  
## Multiple R-squared: 0.5811, Adjusted R-squared: 0.5392   
## F-statistic: 13.87 on 2 and 20 DF, p-value: 0.0001665

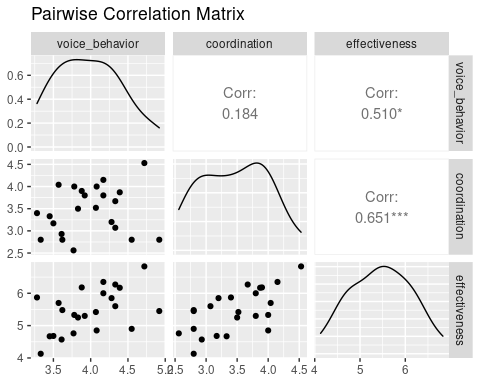
History has the least correlation with the Effectiveness, so it is eliminated.

core\_data <- subset(core\_data, select = -c(history))

final\_model <- lm(effectiveness ~ ., data = core\_data)  
extract\_eq(final\_model, wrap = TRUE, use\_coefs = TRUE)

$$
\begin{aligned}
\operatorname{\widehat{effectiveness}} &= 0.49 + 0.62(\operatorname{voice\\_behavior}) + 0.73(\operatorname{coordination})
\end{aligned}
$$

ggpairs(core\_data, progress = FALSE, title = "Pairwise Correlation Matrix")



full\_lm <- lm(effectiveness ~ ., data = core\_data)  
print(summary(full\_lm))

##   
## Call:  
## lm(formula = effectiveness ~ ., data = core\_data)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -1.06368 -0.32158 0.07167 0.24025 0.88613   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) 0.4877 1.0062 0.485 0.633136   
## voice\_behavior 0.6166 0.2249 2.742 0.012562 \*   
## coordination 0.7276 0.1858 3.916 0.000856 \*\*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 0.4598 on 20 degrees of freedom  
## Multiple R-squared: 0.5811, Adjusted R-squared: 0.5392   
## F-statistic: 13.87 on 2 and 20 DF, p-value: 0.0001665

core\_data\_except\_coordination <- subset(core\_data, select = -c(coordination))  
all\_except\_coordination <- lm(effectiveness ~ ., data = core\_data\_except\_coordination)  
print(summary(all\_except\_coordination))

##   
## Call:  
## lm(formula = effectiveness ~ ., data = core\_data\_except\_coordination)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -1.0047 -0.4724 -0.0942 0.4638 0.9540   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) 2.3627 1.1480 2.058 0.0522 .  
## voice\_behavior 0.7785 0.2867 2.715 0.0130 \*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 0.5965 on 21 degrees of freedom  
## Multiple R-squared: 0.2598, Adjusted R-squared: 0.2246   
## F-statistic: 7.372 on 1 and 21 DF, p-value: 0.01297

core\_data\_except\_voice\_behavior <- subset(core\_data, select = -c(voice\_behavior))  
all\_except\_voice\_behavior <- lm(effectiveness ~ ., data = core\_data\_except\_voice\_behavior)  
print(summary(all\_except\_voice\_behavior))

##   
## Call:  
## lm(formula = effectiveness ~ ., data = core\_data\_except\_voice\_behavior)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -1.05262 -0.44615 0.03993 0.46061 0.63838   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) 2.6177 0.7321 3.576 0.001784 \*\*   
## coordination 0.8212 0.2090 3.928 0.000771 \*\*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 0.5264 on 21 degrees of freedom  
## Multiple R-squared: 0.4236, Adjusted R-squared: 0.3961   
## F-statistic: 15.43 on 1 and 21 DF, p-value: 0.0007709

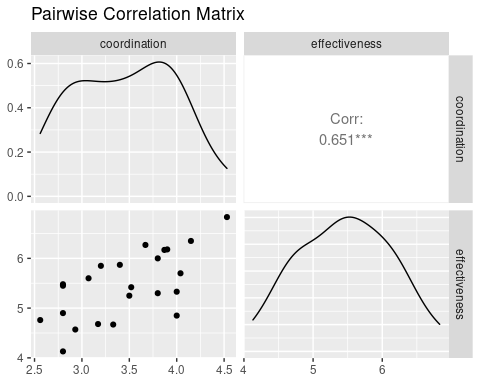
Eliminating Voice Behavior has less detrimental effect on Adjusted R-Sqaured, so it is eliminated.

core\_data <- subset(core\_data, select = -c(voice\_behavior))

final\_model <- lm(effectiveness ~ ., data = core\_data)  
extract\_eq(final\_model, wrap = TRUE, use\_coefs = TRUE)

$$
\begin{aligned}
\operatorname{\widehat{effectiveness}} &= 2.62 + 0.82(\operatorname{coordination})
\end{aligned}
$$

ggpairs(core\_data, progress = FALSE, title = "Pairwise Correlation Matrix")



full\_lm <- lm(effectiveness ~ ., data = core\_data)  
print(summary(full\_lm))

##   
## Call:  
## lm(formula = effectiveness ~ ., data = core\_data)  
##   
## Residuals:  
## Min 1Q Median 3Q Max   
## -1.05262 -0.44615 0.03993 0.46061 0.63838   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) 2.6177 0.7321 3.576 0.001784 \*\*   
## coordination 0.8212 0.2090 3.928 0.000771 \*\*\*  
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 0.5264 on 21 degrees of freedom  
## Multiple R-squared: 0.4236, Adjusted R-squared: 0.3961   
## F-statistic: 15.43 on 1 and 21 DF, p-value: 0.0007709

The optimal model:

final\_model <- lm(effectiveness ~ ., data = optimal\_subset)  
extract\_eq(final\_model, wrap = TRUE, use\_coefs = TRUE)

$$
\begin{aligned}
\operatorname{\widehat{effectiveness}} &= -0.5 - 0.07(\operatorname{tenure}) + 0.02(\operatorname{history}) + 0.82(\operatorname{voice\\_behavior})\ + \\
&\quad 0.79(\operatorname{coordination})
\end{aligned}
$$

teams

## team org team\_size response\_rate response\_count age tenure  
## 1 VxWVZXy qX0d3XD 3 0.67 2 26.00 7.00  
## 2 OlvA1P1 ml4MwXj 4 0.75 3 25.33 6.00  
## 3 5xOnMXW oXoqeP0 3 1.00 3 24.00 4.00  
## 4 JlBq3PN Kl3zeP6 4 0.75 3 25.00 2.00  
## 5 rX1wnPb ylrepPL 6 0.83 5 29.20 4.00  
## 6 5xOnqXW 2PJKklO 3 0.67 2 29.50 9.50  
## 7 KPjegx7 VxWvAXy 4 0.75 3 24.33 3.00  
## 8 WXz0pPm 0xAoGlQ 4 0.75 3 28.67 4.67  
## 9 zP7KKP8 5xO2qXW 6 0.67 4 24.00 3.75  
## 10 5P88oP9 5xO2qXW 7 0.86 6 26.50 6.42  
## 11 4xdmYPE 5P8oox9 3 1.00 3 29.67 8.33  
## 12 YXmyDXN k7lkqxD 3 0.67 2 25.00 3.00  
## 13 DPpkGx8 k7lkqxD 4 0.75 3 23.00 1.67  
## 14 8xNAJXm yEXnYlg 5 1.00 5 23.80 5.00  
## 15 ml4MwXj GVX26X9 5 0.80 4 22.75 4.00  
## 16 gxwyalv M8xNJxm 3 1.00 3 28.67 4.00  
## 17 ylrepPL M8xNJxm 3 0.67 2 30.00 4.50  
## 18 2PJKklO M8xNJxm 3 1.00 3 23.00 0.33  
## 19 VxWvAXy M8xNJxm 6 0.83 5 30.20 7.20  
## 20 0xAoGlQ 3Bl6Nlb 3 0.67 2 27.00 4.50  
## 21 rX1dnlb 3Bl6Nlb 5 0.80 4 26.25 5.75  
## 22 5xO2qXW 3Bl6Nlb 6 0.50 3 24.67 3.33  
## 23 JlBJYlN 3Bl6Nlb 6 1.00 6 35.33 6.25  
## overconfidence history voice\_behavior coordination effectiveness  
## 1 4.00 6.50 3.92 3.80 5.30  
## 2 4.00 12.67 4.72 4.53 6.83  
## 3 5.67 20.33 3.45 3.33 4.67  
## 4 7.33 14.00 3.28 3.40 5.87  
## 5 3.20 11.60 3.77 2.56 4.76  
## 6 6.50 6.00 4.08 4.00 4.85  
## 7 6.67 8.33 4.55 2.80 4.90  
## 8 4.33 11.67 3.61 2.93 4.57  
## 9 3.25 4.25 4.17 4.15 6.35  
## 10 5.83 19.67 4.28 3.20 5.85  
## 11 3.33 5.00 4.33 3.67 6.27  
## 12 6.00 14.00 4.17 3.80 6.00  
## 13 4.67 5.67 3.78 4.00 5.33  
## 14 4.00 32.40 3.57 4.04 5.70  
## 15 6.00 29.50 3.62 2.80 5.48  
## 16 6.33 11.00 4.33 3.07 5.60  
## 17 5.00 19.00 3.83 3.50 5.25  
## 18 4.33 3.00 4.39 3.87 6.17  
## 19 4.60 13.40 4.07 3.52 5.42  
## 20 5.50 12.00 4.92 2.80 5.45  
## 21 5.00 38.00 3.88 3.90 6.18  
## 22 3.33 21.33 3.33 2.80 4.13  
## 23 5.67 34.83 3.50 3.17 4.68

responses

## id team gender tenure team\_history age overconfidence voice eff\_q1  
## 1 KPjenx7 VxWVZXy male 4.0 2 23 4 3.83 6  
## 2 8XM1vXy VxWVZXy male 10.0 11 29 4 4.00 5  
## 3 WXz0NPm OlvA1P1 male 6.0 13 27 3 4.50 7  
## 4 GxD15PN OlvA1P1 female 4.0 12 24 2 4.67 7  
## 5 YxeoLl9 OlvA1P1 female 8.0 13 25 7 5.00 7  
## 6 zP7KkP8 JlBq3PN female 1.0 12 23 6 3.33 7  
## 7 5P88MP9 5xOnMXW male 4.0 12 23 5 3.67 6  
## 8 RXKYnPe 5xOnMXW male 3.0 23 22 6 2.67 6  
## 9 0xAJGPQ JlBq3PN female 3.0 20 27 8 3.67 6  
## 10 5xOnqXW JlBq3PN female 2.0 10 25 8 2.83 6  
## 11 JlBqYPN 5xOnMXW male 5.0 26 27 6 4.00 6  
## 12 8XM1qXy ml4MwXj male 1.0 36 18 5 4.67 6  
## 13 WXz0pPm ml4MwXj male 4.0 48 24 6 2.83 5  
## 14 Yxeo0l9 0xAoGlQ female 7.0 4 30 4 5.00 6  
## 15 zP7KKP8 5xO2qXW female 7.0 42 30 3 4.83 7  
## 16 5P88oP9 JlBJYlN female 7.0 42 25 4 5.00 7  
## 17 RXKY8Pe DPpkGx8 female 1.0 5 22 4 3.67 6  
## 18 BXqe5Xb rX1wnPb male 6.0 11 30 3 3.17 6  
## 19 EXnKYxg rX1wnPb female 4.0 10 30 3 4.00 7  
## 20 NP97vXA YXmyDXN male 1.0 8 21 6 3.67 7  
## 21 GlgNzPg YXmyDXN male 5.0 20 29 6 4.67 6  
## 22 oPGYjXz DPpkGx8 male 3.0 2 22 4 4.17 6  
## 23 VX2m6l9 8xNAJXm female 5.0 24 24 3 3.33 7  
## 24 JPRoKly 8xNAJXm male 6.0 60 23 6 4.33 7  
## 25 YXmyDXN 8xNAJXm male 2.0 6 25 2 2.17 6  
## 26 DPpkGx8 8xNAJXm male 7.0 36 24 4 4.17 6  
## 27 2PyOwXW 8xNAJXm male 5.0 36 23 5 3.83 6  
## 28 mPZ9Yxv 5xOnqXW male 16.0 2 36 6 4.00 6  
## 29 8xNAJXm KPjegx7 male 5.0 9 22 6 5.00 3  
## 30 WlQnRX0 5xOnqXW male 3.0 10 23 7 4.17 5  
## 31 Bl6eNPb rX1wnPb male 1.0 11 31 3 3.83 6  
## 32 qX0d3XD gxwyalv male 5.0 23 32 7 4.33 7  
## 33 ml4MwXj gxwyalv male 5.0 3 30 4 4.50 6  
## 34 7lEA9lQ rX1wnPb female 4.0 2 30 3 3.83 5  
## 35 oXoqeP0 VxWvAXy male 15.0 40 37 3 4.50 6  
## 36 jXVAWle zP7KKP8 male 3.0 5 22 4 4.33 7  
## 37 8PYv8lL zP7KKP8 male 9.0 5 32 1 3.83 6  
## 38 ePbaqxJ 5P88oP9 male 10.0 34 29 7 4.33 7  
## 39 rlLNAx2 5P88oP9 male 6.0 21 30 5 4.00 6  
## 40 gxwyalv 5P88oP9 male 4.0 4 24 5 4.33 6  
## 41 ylrepPL 5P88oP9 male 10.0 22 30 5 4.33 6  
## 42 2PJKklO 5P88oP9 female 1.5 4 22 6 3.67 7  
## 43 RX5ybXO zP7KKP8 male 2.0 4 21 3 4.67 7  
## 44 VxWvAXy zP7KKP8 female 1.0 3 21 5 3.83 7  
## 45 Olv9DP1 KPjegx7 female 1.0 9 23 6 4.33 7  
## 46 0xAoGlQ KPjegx7 female 3.0 7 28 8 4.33 7  
## 47 rX1dnlb 5P88oP9 male 7.0 33 24 7 5.00 7  
## 48 5xO2qXW rX1dnlb male 3.0 16 25 5 3.67 6  
## 49 JlBJYlN WXz0pPm male 2.0 12 26 1 2.83 7  
## 50 KPjEgx7 VxWvAXy female 3.0 1 25 4 4.00 7  
## 51 WXzqplm 5xO2qXW female 2.0 18 24 3 3.00 5  
## 52 GxDEwPN WXz0pPm male 5.0 3 32 8 4.33 5  
## 53 Yxe40X9 WXz0pPm male 7.0 20 28 4 3.67 5  
## 54 k7lkqxD JlBJYlN female 1.5 17 24 3 2.17 6  
## 55 5GlgzPg 4xdmYPE male 7.0 5 29 3 3.83 7  
## 56 roPGjxz 4xdmYPE male 6.0 5 26 5 4.33 6  
## 57 GVX26X9 4xdmYPE female 12.0 5 34 2 4.83 7  
## 58 D4xdYPE JlBJYlN male 6.0 6 66 10 2.83 1  
## 59 wJPRKly gxwyalv female 2.0 7 24 8 4.17 7  
## 60 VYXmDlN DPpkGx8 female 1.0 10 25 6 3.50 6  
## 61 M8xNJxm ml4MwXj male 1.0 10 19 6 3.50 5  
## 62 3Bl6Nlb ml4MwXj male 10.0 24 30 7 3.50 6  
## 63 zml4wPj rX1wnPb male 5.0 24 25 4 4.00 6  
## 64 N7lE9lQ ylrepPL female 3.0 36 33 7 3.67 6  
## 65 1oXoeP0 VxWvAXy female 2.0 5 22 7 4.00 6  
## 66 aKl3ex6 VxWvAXy male 8.0 6 36 4 3.67 6  
## 67 eYXaMXq JlBJYlN female 14.0 52 36 5 4.00 6  
## 68 yjXVWxe ylrepPL male 6.0 2 27 3 4.00 6  
## 69 E8PY8xL 2PJKklO female 0.0 4 22 3 4.33 7  
## 70 1ePbqxJ 2PJKklO female 0.0 4 24 3 4.67 7  
## 71 GylrpxL 2PJKklO male 1.0 1 23 7 4.17 7  
## 72 7RX5bxO VxWvAXy male 8.0 15 31 5 4.17 6  
## 73 oVxWAly 5xO2qXW male 1.0 4 20 4 2.17 5  
## 74 eOlvDx1 0xAoGlQ female 2.0 20 24 7 4.83 7  
## 75 y0xAGlQ rX1dnlb female 5.0 28 27 3 4.00 6  
## 76 ZrX1nxb rX1dnlb male 8.0 24 26 8 3.83 7  
## 77 K5xOqlW JlBJYlN female 7.0 84 36 6 3.33 6  
## 78 mJlBYPN rX1dnlb male 7.0 84 27 4 4.00 6  
## 79 mKPjgl7 JlBJYlN female 2.0 8 25 6 3.67 7  
## eff\_q2 eff\_q3 eff\_q4 eff\_q5 eff\_q6 eff\_q7 eff\_q8 eff\_q9 eff\_q10 coord\_q1  
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## 2 3 5 6 3 5 6 6 5 3 5  
## 3 7 7 7 7 7 7 7 7 7 5  
## 4 2 7 7 7 7 7 7 7 7 5  
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## 8 5 4 7 2 5 5 6 6 4 3  
## 9 6 7 7 7 4 6 6 4 6 4  
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## 11 6 5 7 4 5 5 6 5 5 4  
## 12 5 7 7 6 6 3 6 3 4 2  
## 13 6 7 7 7 4 6 4 6 4 1  
## 14 6 6 6 5 4 5 5 3 5 3  
## 15 6 6 7 5 4 3 5 2 4 3  
## 16 7 6 7 5 4 3 5 1 4 3  
## 17 4 6 7 6 6 5 6 6 5 4  
## 18 1 6 7 5 5 6 6 4 4 4  
## 19 1 6 7 3 7 5 7 4 6 5  
## 20 3 6 7 5 6 5 6 5 6 4  
## 21 7 7 7 7 6 7 6 5 6 4  
## 22 6 5 6 4 5 5 4 5 6 5  
## 23 7 7 7 5 6 7 7 6 7 5  
## 24 6 7 7 4 3 5 5 6 7 5  
## 25 5 6 6 1 6 5 6 5 7 4  
## 26 5 6 5 4 5 6 5 7 6 4  
## 27 5 5 5 4 4 6 5 7 7 4  
## 28 3 5 6 4 6 5 6 4 6 4  
## 29 6 6 7 5 4 3 5 2 3 4  
## 30 1 5 7 3 6 6 6 4 3 4  
## 31 6 3 7 2 2 5 5 2 4 2  
## 32 1 5 7 4 7 6 7 4 6 4  
## 33 2 7 7 7 4 6 7 4 6 4  
## 34 5 6 7 5 6 5 5 5 5 4  
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## 37 6 7 7 6 7 7 7 7 6 4  
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## 47 7 7 7 5 5 4 6 5 6 5  
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## 50 6 7 7 6 6 4 6 4 6 4  
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## 53 5 6 6 3 4 5 4 3 5 4  
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## 56 3 7 6 5 6 6 6 6 5 5  
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## 4 4 4 5 4 4 5 5 5  
## 5 4 5 5 4 5 5 5 5  
## 6 1 2 4 4 2 4 5 3  
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## 18 3 3 4 2 3 3 3 4  
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## 20 3 4 3 3 4 4 3 3  
## 21 4 5 4 4 5 5 4 4  
## 22 4 3 4 4 4 4 4 4  
## 23 3 4 5 5 3 3 4 4  
## 24 3 5 5 4 5 5 5 4  
## 25 3 5 4 2 2 2 2 2  
## 26 4 5 4 3 5 5 4 3  
## 27 3 4 4 4 3 4 5 4  
## 28 4 4 4 4 4 4 4 4  
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## 37 4 4 4 4 4 4 3 4  
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## 1 3 4 33 25 2008 2005 10  
## 2 4 4 30 20 2000 1992 50  
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## 4 5 4 35 30 2009 2007 45  
## 5 5 5 31 30 1995 1990 30  
## 6 4 2 40 32 2010 2009 45  
## 7 2 4 60 45 2010 2000 50  
## 8 4 2 35 32 2000 1950 30  
## 9 4 4 25 20 1970 1950 25  
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## 12 4 5 32 31 2005 1990 10  
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## 14 5 5 40 20 2000 1990 20  
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## 19 4 4 34 24 2010 2002 30  
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## 30 4 5 32 28 1970 1950 15  
## 31 4 3 29 27 2008 2006 50  
## 32 4 5 35 25 2005 2000 80  
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## 38 4 4 34 31 2000 1995 15  
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## 70 5 4 40 30 2015 2000 40  
## 71 5 3 34 30 2005 1995 180  
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## 73 2 2 32 30 2009 2005 120  
## 74 5 5 30 23 2005 2000 25  
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## 77 4 3 33 33 2008 2007 27  
## 78 4 4 33 30 2004 2000 110  
## 79 3 4 35 31 2005 1998 100  
## ovconf\_q3l ovconf\_q4h ovconf\_q4l ovconf\_q5h ovconf\_q5l ovconf\_q6h ovconf\_q6l  
## 1 5 2003 2000 30 20 2000 1960  
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## 7 40 2000 1995 45 35 1970 1960  
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## 74 20 2000 1998 50 40 2000 1995  
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## 78 60 2000 1996 15 5 1996 1990  
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## ovconf\_q7h ovconf\_q7l ovconf\_q8h ovconf\_q8l ovconf\_q9h ovconf\_q9l  
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## ovconf\_q10h ovconf\_q10l  
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## 11 80 60  
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R.version

## \_   
## platform x86\_64-pc-linux-gnu   
## arch x86\_64   
## os linux-gnu   
## system x86\_64, linux-gnu   
## status   
## major 3   
## minor 6.3   
## year 2020   
## month 02   
## day 29   
## svn rev 77875   
## language R   
## version.string R version 3.6.3 (2020-02-29)  
## nickname Holding the Windsock

.packages()