Multilevel Analysis

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27/04/2020

Data

Scores

Multilevel modelling

```
setwd("G:/My Drive/Master in Statistics/Multilevel analysis/Paper/")
load("MLData.RData")

# library(ggplot2)
#
# print("# Trust")
#
# ggplot(data = ds_filtradaALLScores, aes(x = eduyrs, y=Trust, group=cntry)) +
#   geom_point()+
#   geom_smooth(method = "lm", se = TRUE, aes(colour = cntry)) +
#   facet_wrap(. ~ essround) +
#   xlab("Years of education") + ylab("Trust index") +
#   theme(legend.position = "none")
# ggplot(data = ds_filtradaALLScores, aes(x = agea, y=Trust, group=cntry)) +
#   geom_point()+
#   geom_smooth(method = "lm", se = TRUE, aes(colour = cntry)) +
#   facet_wrap(. ~ essround) +
#   xlab("Age") + ylab("Trust index") +
#   theme(legend.position = "none")
# ggplot(data = na.omit(ds_filtradaALLScores[,c("gndr","cntry","essround","Trust")]), aes(x = factor(gn
#   geom_point()+
#   geom_smooth(method = "lm", se = TRUE, aes(colour = cntry)) +
#   facet_wrap(. ~ essround) +
#   xlab("Gender") + ylab("Trust index") +
#   theme(legend.position = "none")
# ggplot(data = ds_filtradaALLScores, aes(x = Benev, y=Trust, group=cntry)) +
#   geom_point()+
#   geom_smooth(method = "lm", se = TRUE, aes(colour = cntry)) +
#   facet_wrap(. ~ essround) +
#   xlab("Benevolence index") + ylab("Trust index") +
#   theme(legend.position = "none")
# ggplot(data = ds_filtradaALLScores, aes(x = eduyrs, y=Trust, group=essround)) +
#   geom_point()+
#   geom_smooth(method = "lm", se = TRUE, aes(colour = essround)) +
#   facet_wrap(cntry ~ .) +
#   xlab("Years of education") + ylab("Trust index") +
#   theme(legend.position = "none")
# ggplot(data = ds_filtradaALLScores, aes(x = agea, y=Trust, group=essround)) +
#   geom_point()+
#   geom_smooth(method = "lm", se = TRUE, aes(colour = essround)) +
```

```
#   facet_wrap(cntry ~ .) +
#   xlab("Age") + ylab("Trust index") +
#   theme(legend.position = "none")
# ggplot(data = na.omit(ds_filtradaALLScores[,c("gndr","cntry","essround","Trust")]), aes(x = factor(gn
#   geom_point()+
#   geom_smooth(method = "lm", se = TRUE, aes(colour = essround)) +
#   facet_wrap(cntry ~ .) +
#   xlab("Gender") + ylab("Trust index") +
#   theme(legend.position = "none")
# ggplot(data = ds_filtradaALLScores, aes(x = Benev, y=Trust, group=essround)) +
#   geom_point()+
#   geom_smooth(method = "lm", se = TRUE, aes(colour = essround)) +
#   facet_wrap(cntry ~ .) +
#   xlab("Benevolence index") + ylab("Trust index") +
#   theme(legend.position = "none")
#
#
# ggplot(data = ds_filtradaALLScores, aes(x = CntryEduyrs, y=Trust, group=essround)) +
#   geom_point()+
#   geom_smooth(method = "lm", se = TRUE, aes(colour = essround)) +
#   xlab("Country's Years of education") + ylab("Trust index") +
#   theme(legend.position = "none")
# ggplot(data = ds_filtradaALLScores, aes(x = HDI, y=Trust, group=essround)) +
#   geom_point()+
#   geom_smooth(method = "lm", se = TRUE, aes(colour = essround)) +
#   xlab("Country's HDI") + ylab("Trust index") +
#   theme(legend.position = "none")



ds_filtrada1 <- ds_filtradaALLScores %>%
  select(cntry,essround,Trust, agea, gndrD,gndr, eduyrs, Benev, HDI, cntry, essround, CntryEduyrs) %>%
  na.omit()

modelNull <- lmer(Trust ~  (1|cntry) +
                    (1|cntry:essround),
                  data=ds_filtrada1, REML=FALSE)
summary(modelNull)
```

```
## Linear mixed model fit by maximum likelihood . t-tests use
##   Satterthwaite's method [lmerModLmerTest]
## Formula: Trust ~ (1 | cntry) + (1 | cntry:essround)
##    Data: ds_filtrada1
##
##       AIC       BIC    logLik  deviance  df.resid
## 1545082.3 1545122.9 -772537.2 1545074.3    184917
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -4.0735 -0.6287  0.0776  0.6858  3.8223
##
## Random effects:
##  Groups         Name        Variance Std.Dev.
##  cntry:essround (Intercept)   2.476   1.573
```

```
##  cntry          (Intercept)  72.418   8.510
##  Residual                    248.370  15.760
## Number of obs: 184921, groups:  cntry:essround, 117; cntry, 31
##
## Fixed effects:
##             Estimate Std. Error     df t value Pr(>|t|)
## (Intercept)   51.742      1.538 30.831   33.65   <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## convergence code: 0
## Model failed to converge with max|grad| = 0.00313001 (tol = 0.002, component 1)
```

```
VarCorr(modelNull) %>% as_tibble() %>%
  mutate(icc=vcov/sum(vcov)) %>%
  select(grp, vcov, icc)
```

```
## # A tibble: 3 x 3
##   grp              vcov     icc
##   <chr>           <dbl>   <dbl>
## 1 cntry:essround   2.48 0.00766
## 2 cntry           72.4  0.224
## 3 Residual       248.   0.768
```

```
ds_filtrada1$Fit0 <- predict(modelNull)
#Eduyrs
model1a <- lmer(Trust ~ eduyrs +
                  (1|cntry) +
                  (1|cntry:essround),
              data=ds_filtrada1, REML=FALSE)
VarCorr(model1a)
```

```
##  Groups          Name        Std.Dev.
##  cntry:essround (Intercept)  1.4506
##  cntry          (Intercept)  8.1200
##  Residual                    15.5842
```

```
anova(model1a)
```

```
## Type III Analysis of Variance Table with Satterthwaite's method
##         Sum Sq Mean Sq NumDF  DenDF F value    Pr(>F)
## eduyrs 1021251 1021251     1 184902    4205 < 2.2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
ranova(model1a)
```

```
## ANOVA-like table for random-effects: Single term deletions
##
## Model:
## Trust ~ eduyrs + (1 | cntry) + (1 | cntry:essround)
##                       npar  logLik     AIC    LRT Df Pr(>Chisq)
## <none>                   5 -770459 1540927
## (1 | cntry)              4 -770577 1541162 236.97  1  < 2.2e-16 ***
## (1 | cntry:essround)     4 -770938 1541884 958.78  1  < 2.2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
model1b <- lmer(Trust ~ 1 + eduyrs +
                (1 + eduyrs|cntry) +
                (1         |cntry:essround),
              data=ds_filtrada1, REML=FALSE)
VarCorr(model1b)
```

```
##  Groups         Name        Std.Dev. Corr
##  cntry:essround (Intercept)  1.44335
##  cntry          (Intercept)  8.98376
##                 eduyrs       0.21543 -0.453
##  Residual                    15.56865
```

```
anova(model1b)
```

```
## Type III Analysis of Variance Table with Satterthwaite's method
##        Sum Sq Mean Sq NumDF  DenDF F value    Pr(>F)
## eduyrs  55507   55507     1 29.362  229.01 2.105e-15 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
ranova(model1b)
```

```
## ANOVA-like table for random-effects: Single term deletions
##
## Model:
## Trust ~ eduyrs + (1 + eduyrs | cntry) + (1 | cntry:essround)
##                                 npar  logLik     AIC    LRT Df Pr(>Chisq)
## <none>                             7 -770315 1540645
## eduyrs in (1 + eduyrs | cntry)     5 -770459 1540927 286.41  2  < 2.2e-16
## (1 | cntry:essround)               6 -770787 1541587 943.86  1  < 2.2e-16
##
## <none>
## eduyrs in (1 + eduyrs | cntry) ***
## (1 | cntry:essround)           ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
model1c <- lmer(Trust ~ 1 + eduyrs +
                (1         |cntry) +
                (1 + eduyrs|cntry:essround),
              data=ds_filtrada1, REML=FALSE)
VarCorr(model1c)
```

```
##  Groups         Name        Std.Dev. Corr
##  cntry:essround (Intercept)  3.96907
##                 eduyrs       0.23692 -0.936
##  cntry          (Intercept) 26.30873
##  Residual                    15.56144
```

```
anova(model1c)
```

```
## Type III Analysis of Variance Table with Satterthwaite's method
##        Sum Sq Mean Sq NumDF  DenDF F value    Pr(>F)
## eduyrs 163872  163872     1 103.71  676.71 < 2.2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
ranova(model1c)
```

```
## ANOVA-like table for random-effects: Single term deletions
##
## Model:
## Trust ~ eduyrs + (1 | cntry) + (1 + eduyrs | cntry:essround)
##                                          npar  logLik     AIC    LRT Df
## <none>                                      7 -770328 1540669
## (1 | cntry)                                 6 -770423 1540859 191.43  1
## eduyrs in (1 + eduyrs | cntry:essround)     5 -770459 1540927 262.02  2
##                                          Pr(>Chisq)
## <none>
## (1 | cntry)                               < 2.2e-16 ***
## eduyrs in (1 + eduyrs | cntry:essround)   < 2.2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
anova(model1a,model1b,model1c)
```

```
## Data: ds_filtrada1
## Models:
## model1a: Trust ~ eduyrs + (1 | cntry) + (1 | cntry:essround)
## model1b: Trust ~ 1 + eduyrs + (1 + eduyrs | cntry) + (1 | cntry:essround)
## model1c: Trust ~ 1 + eduyrs + (1 | cntry) + (1 + eduyrs | cntry:essround)
##         Df     AIC     BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
## model1a  5 1540927 1540978 -770459  1540917
## model1b  7 1540645 1540716 -770315  1540631 286.41      2     <2e-16 ***
## model1c  7 1540669 1540740 -770328  1540655   0.00      0          1
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
#Age
model2a <- lmer(Trust ~ agea +
                (1|cntry) +
                (1|cntry:essround),
             data=ds_filtrada1, REML=FALSE)
VarCorr(model2a)
```

```
##  Groups          Name        Std.Dev.
##  cntry:essround (Intercept)  1.5761
##  cntry          (Intercept)  8.5066
##  Residual                    15.7594
```

```
anova(model2a)
```

```
## Type III Analysis of Variance Table with Satterthwaite's method
##      Sum Sq Mean Sq NumDF  DenDF F value   Pr(>F)
## agea 1793.5  1793.5     1 184876  7.2212 0.007205 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
ranova(model2a)
```

```
## ANOVA-like table for random-effects: Single term deletions
##
## Model:
## Trust ~ agea + (1 | cntry) + (1 | cntry:essround)
```

```
##                       npar  logLik     AIC    LRT Df Pr(>Chisq)
## <none>                   5 -772534 1545077
## (1 | cntry)              4 -772649 1545306  231.1  1  < 2.2e-16 ***
## (1 | cntry:essround)     4 -773103 1546214 1139.2  1  < 2.2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
model2b <- lmer(Trust ~ 1 + agea +
                (1 + agea|cntry) +
                (1       |cntry:essround),
              data=ds_filtrada1, REML=FALSE)
VarCorr(model2b)
```

```
##  Groups          Name        Std.Dev.  Corr
##  cntry:essround (Intercept)  1.566423
##  cntry          (Intercept)  7.971934
##                 agea         0.087802 0.754
##  Residual                    15.710468
```

```
anova(model2b)
```

```
## Type III Analysis of Variance Table with Satterthwaite's method
##      Sum Sq Mean Sq NumDF  DenDF F value Pr(>F)
## agea 353.58  353.58     1 14.287  1.4326 0.2508
```

```
ranova(model2b)
```

```
## ANOVA-like table for random-effects: Single term deletions
##
## Model:
## Trust ~ agea + (1 + agea | cntry) + (1 | cntry:essround)
##                             npar  logLik     AIC    LRT Df Pr(>Chisq)
## <none>                         7 -772006 1544027
## agea in (1 + agea | cntry)     5 -772534 1545077 1054.5  2  < 2.2e-16 ***
## (1 | cntry:essround)           6 -772585 1545183 1157.9  1  < 2.2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
model2c <- lmer(Trust ~ 1 + agea +
                (1       |cntry) +
                (1 + agea|cntry:essround),
              data=ds_filtrada1, REML=FALSE)
VarCorr(model2c)
```

```
##  Groups          Name        Std.Dev.  Corr
##  cntry:essround (Intercept)  1.941613
##                 agea         0.069093 -0.687
##  cntry          (Intercept) 15.992190
##  Residual                   15.707645
```

```
anova(model2c)
```

```
## Type III Analysis of Variance Table with Satterthwaite's method
##      Sum Sq Mean Sq NumDF  DenDF F value Pr(>F)
## agea 428.63  428.63     1 126.33  1.7372 0.1899
```

```
ranova(model2c)
```

```
## ANOVA-like table for random-effects: Single term deletions
```

```
##
## Model:
## Trust ~ agea + (1 | cntry) + (1 + agea | cntry:essround)
##                                     npar  logLik     AIC    LRT Df
## <none>                                 7 -772082 1544178
## (1 | cntry)                            6 -772133 1544278 102.07  1
## agea in (1 + agea | cntry:essround)    5 -772534 1545077 903.31  2
##                                     Pr(>Chisq)
## <none>
## (1 | cntry)                          < 2.2e-16 ***
## agea in (1 + agea | cntry:essround)  < 2.2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
anova(model2a,model2b,model2c)
```

```
## Data: ds_filtrada1
## Models:
## model2a: Trust ~ agea + (1 | cntry) + (1 | cntry:essround)
## model2b: Trust ~ 1 + agea + (1 + agea | cntry) + (1 | cntry:essround)
## model2c: Trust ~ 1 + agea + (1 | cntry) + (1 + agea | cntry:essround)
##         Df     AIC     BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
## model2a  5 1545077 1545128 -772534  1545067
## model2b  7 1544027 1544098 -772006  1544013 1054.5      2     <2e-16 ***
## model2c  7 1544178 1544249 -772082  1544164    0.0      0          1
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
#Gender
model3a <- lmer(Trust ~ factor(gndr) +
                (1|cntry) +
                (1|cntry:essround),
              data=ds_filtrada1, REML=FALSE)
VarCorr(model3a)
```

```
##  Groups         Name        Std.Dev.
##  cntry:essround (Intercept)  1.5765
##  cntry          (Intercept)  8.5165
##  Residual                   15.7566
```

```
anova(model3a)
```

```
## Type III Analysis of Variance Table with Satterthwaite's method
##              Sum Sq Mean Sq NumDF  DenDF F value    Pr(>F)
## factor(gndr)  18154   18154     1 184827  73.121 < 2.2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
ranova(model3a)
```

```
## ANOVA-like table for random-effects: Single term deletions
##
## Model:
## Trust ~ factor(gndr) + (1 | cntry) + (1 | cntry:essround)
##                      npar  logLik     AIC     LRT Df Pr(>Chisq)
## <none>                  5 -772501 1545011
## (1 | cntry)             4 -772616 1545241  231.35  1  < 2.2e-16 ***
```

```
## (1 | cntry:essround)    4 -773071 1546149 1140.17  1  < 2.2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
model3b <- lmer(Trust ~ 1 + factor(gndr) +
                (1 + factor(gndr)|cntry) +
                (1       |cntry:essround),
             data=ds_filtrada1, REML=FALSE)
VarCorr(model3b)
```

```
##  Groups         Name               Std.Dev. Corr
##  cntry:essround (Intercept)         1.5741
##  cntry          (Intercept)         8.1812
##                 factor(gndr)Female  1.1018  0.581
##  Residual                          15.7485
```

```
anova(model3b)
```

```
## Type III Analysis of Variance Table with Satterthwaite's method
##              Sum Sq Mean Sq NumDF  DenDF F value   Pr(>F)
## factor(gndr) 1958.8  1958.8     1 28.553  7.8981 0.008842 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
ranova(model3b)
```

```
## ANOVA-like table for random-effects: Single term deletions
##
## Model:
## Trust ~ factor(gndr) + (1 + factor(gndr) | cntry) + (1 | cntry:essround)
##                                           npar  logLik     AIC    LRT Df
## <none>                                       7 -772430 1544874
## factor(gndr) in (1 + factor(gndr) | cntry)    5 -772501 1545011  141.0  2
## (1 | cntry:essround)                         6 -772998 1546009 1136.5  1
##                                           Pr(>Chisq)
## <none>
## factor(gndr) in (1 + factor(gndr) | cntry)  < 2.2e-16 ***
## (1 | cntry:essround)                        < 2.2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
model3c <- lmer(Trust ~ 1 + factor(gndr) +
                (1       |cntry) +
                (1 + factor(gndr)|cntry:essround),
             data=ds_filtrada1, REML=FALSE)
VarCorr(model3c)
```

```
##  Groups         Name               Std.Dev. Corr
##  cntry:essround (Intercept)         1.4954
##                 factor(gndr)Female  1.0399  0.116
##  cntry          (Intercept)         8.2630
##  Residual                          15.7484
```

```
anova(model3c)
```

```
## Type III Analysis of Variance Table with Satterthwaite's method
##              Sum Sq Mean Sq NumDF  DenDF F value    Pr(>F)
## factor(gndr) 6647.9  6647.9     1 110.97  26.805 1.013e-06 ***
```

```
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
ranova(model3c)
```

```
## ANOVA-like table for random-effects: Single term deletions
##
## Model:
## Trust ~ factor(gndr) + (1 | cntry) + (1 + factor(gndr) | cntry:essround)
##                                                      npar  logLik     AIC
## <none>                                                  7 -772459 1544933
## (1 | cntry)                                             6 -772561 1545135
## factor(gndr) in (1 + factor(gndr) | cntry:essround)     5 -772501 1545011
##                                                       LRT Df Pr(>Chisq)
## <none>
## (1 | cntry)                                          203.966  1  < 2.2e-16
## factor(gndr) in (1 + factor(gndr) | cntry:essround)  82.447  2  < 2.2e-16
##
## <none>
## (1 | cntry)                                          ***
## factor(gndr) in (1 + factor(gndr) | cntry:essround) ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
anova(model3a,model3b,model3c)
```

```
## Data: ds_filtrada1
## Models:
## model3a: Trust ~ factor(gndr) + (1 | cntry) + (1 | cntry:essround)
## model3b: Trust ~ 1 + factor(gndr) + (1 + factor(gndr) | cntry) + (1 |
## model3b:     cntry:essround)
## model3c: Trust ~ 1 + factor(gndr) + (1 | cntry) + (1 + factor(gndr) |
## model3c:     cntry:essround)
##         Df     AIC     BIC  logLik deviance Chisq Chi Df Pr(>Chisq)
## model3a  5 1545011 1545062 -772501  1545001
## model3b  7 1544874 1544945 -772430  1544860   141      2     <2e-16 ***
## model3c  7 1544933 1545004 -772459  1544919     0      0          1
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
#Benevolence
model4a <- lmer(Trust ~ Benev +
                  (1|cntry) +
                  (1|cntry:essround),
              data=ds_filtrada1, REML=FALSE)
VarCorr(model4a)
```

```
##  Groups          Name        Std.Dev.
##  cntry:essround (Intercept)  1.5440
##  cntry          (Intercept)  8.4084
##  Residual                    15.6434
```

```
anova(model4a)
```

```
## Type III Analysis of Variance Table with Satterthwaite's method
##       Sum Sq Mean Sq NumDF  DenDF F value    Pr(>F)
## Benev 675913  675913     1 184789    2762 < 2.2e-16 ***
```

```
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
ranova(model4a)
```

```
## ANOVA-like table for random-effects: Single term deletions
##
## Model:
## Trust ~ Benev + (1 | cntry) + (1 | cntry:essround)
##                       npar  logLik     AIC     LRT Df Pr(>Chisq)
## <none>                   5 -771166 1542343
## (1 | cntry)              4 -771283 1542573  232.29  1  < 2.2e-16 ***
## (1 | cntry:essround)     4 -771713 1543434 1093.48  1  < 2.2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
model4b <- lmer(Trust ~ 1 + Benev +
                  (1 + Benev|cntry) +
                  (1       |cntry:essround),
              data=ds_filtrada1, REML=FALSE)
VarCorr(model4b)
```

```
##  Groups          Name        Std.Dev.  Corr
##  cntry:essround (Intercept)  1.542904
##  cntry          (Intercept) 10.953581
##                 Benev        0.056485 -0.555
##  Residual                    15.630125
```

```
anova(model4b)
```

```
## Type III Analysis of Variance Table with Satterthwaite's method
##       Sum Sq Mean Sq NumDF DenDF F value    Pr(>F)
## Benev  58380   58380     1 26.76  238.97 7.348e-15 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
ranova(model4b)
```

```
## ANOVA-like table for random-effects: Single term deletions
##
## Model:
## Trust ~ Benev + (1 + Benev | cntry) + (1 | cntry:essround)
##                               npar  logLik     AIC     LRT Df Pr(>Chisq)
## <none>                           7 -771047 1542108
## Benev in (1 + Benev | cntry)     5 -771166 1542343  238.57  2  < 2.2e-16
## (1 | cntry:essround)             6 -771593 1543198 1092.13  1  < 2.2e-16
##
## <none>
## Benev in (1 + Benev | cntry) ***
## (1 | cntry:essround)         ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
model4c <- lmer(Trust ~ 1 + Benev +
                  (1       |cntry) +
                  (1 + Benev|cntry:essround),
              data=ds_filtrada1, REML=FALSE)
VarCorr(model4c)
```

```
##  Groups         Name        Std.Dev. Corr
##  cntry:essround (Intercept) 19.20059
##                 Benev        0.22455 -0.997
##  cntry          (Intercept)  9.51565
##  Residual                    15.61222
```

```
anova(model4c)
```

```
## Type III Analysis of Variance Table with Satterthwaite's method
##       Sum Sq Mean Sq NumDF  DenDF F value    Pr(>F)
## Benev  14885   14885     1 631.66  61.068 2.311e-14 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
ranova(model4c)
```

```
## ANOVA-like table for random-effects: Single term deletions
##
## Model:
## Trust ~ Benev + (1 | cntry) + (1 + Benev | cntry:essround)
##                                        npar  logLik     AIC    LRT Df
## <none>                                    7 -771024 1542061
## (1 | cntry)                               6 -771088 1542188 128.25  1
## Benev in (1 + Benev | cntry:essround)     5 -771166 1542343 285.42  2
##                                        Pr(>Chisq)
## <none>
## (1 | cntry)                             < 2.2e-16 ***
## Benev in (1 + Benev | cntry:essround)   < 2.2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
anova(model4a,model4b,model4c)
```

```
## Data: ds_filtrada1
## Models:
## model4a: Trust ~ Benev + (1 | cntry) + (1 | cntry:essround)
## model4b: Trust ~ 1 + Benev + (1 + Benev | cntry) + (1 | cntry:essround)
## model4c: Trust ~ 1 + Benev + (1 | cntry) + (1 + Benev | cntry:essround)
##         Df     AIC     BIC  logLik deviance   Chisq Chi Df Pr(>Chisq)
## model4a  5 1542343 1542393 -771166  1542333
## model4b  7 1542108 1542179 -771047  1542094 238.565      2  < 2.2e-16 ***
## model4c  7 1542061 1542132 -771024  1542047  46.852      0  < 2.2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
#CntryEduyrs
model5a <- lmer(Trust ~ CntryEduyrs +
                (1|cntry) +
                (1|cntry:essround),
              data=ds_filtrada1, REML=FALSE)
VarCorr(model5a)
```

```
##  Groups         Name        Std.Dev.
##  cntry:essround (Intercept)  1.2977
##  cntry          (Intercept)  7.0975
##  Residual                    15.7598
```

```
anova(model5a)
```

```
## Type III Analysis of Variance Table with Satterthwaite's method
##             Sum Sq Mean Sq NumDF  DenDF F value    Pr(>F)
## CntryEduyrs  12450   12450     1 101.21  50.128 1.941e-10 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
ranova(model5a)
```

```
## ANOVA-like table for random-effects: Single term deletions
##
## Model:
## Trust ~ CntryEduyrs + (1 | cntry) + (1 | cntry:essround)
##                       npar  logLik     AIC    LRT Df Pr(>Chisq)
## <none>                   5 -772516 1545043
## (1 | cntry)              4 -772630 1545268 227.48  1  < 2.2e-16 ***
## (1 | cntry:essround)     4 -772860 1545729 688.26  1  < 2.2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
model5b <- lmer(Trust ~ 1 + CntryEduyrs +
                (1 + CntryEduyrs|cntry) +
                (1       |cntry:essround),
              data=ds_filtrada1, REML=FALSE)
VarCorr(model5b)
```

```
##  Groups          Name        Std.Dev. Corr
##  cntry:essround (Intercept)  1.2609
##  cntry          (Intercept) 26.4199
##                 CntryEduyrs  1.7068  -0.974
##  Residual                    15.7595
```

```
anova(model5b)
```

```
## Type III Analysis of Variance Table with Satterthwaite's method
##             Sum Sq Mean Sq NumDF  DenDF F value    Pr(>F)
## CntryEduyrs 7824.8  7824.8     1 9.0645  31.506 0.0003203 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
ranova(model5b)
```

```
## ANOVA-like table for random-effects: Single term deletions
##
## Model:
## Trust ~ CntryEduyrs + (1 + CntryEduyrs | cntry) + (1 | cntry:essround)
##                                           npar  logLik     AIC    LRT Df
## <none>                                       7 -772518 1545050
## CntryEduyrs in (1 + CntryEduyrs | cntry)     5 -772516 1545043  -3.02  2
## (1 | cntry:essround)                         6 -772771 1545554 506.61  1
##                                           Pr(>Chisq)
## <none>
## CntryEduyrs in (1 + CntryEduyrs | cntry)          1
## (1 | cntry:essround)                         <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```r
model5c <- lmer(Trust ~ 1 + CntryEduyrs +
                (1       |cntry) +
                (1 + CntryEduyrs|cntry:essround),
              data=ds_filtrada1, REML=FALSE)
VarCorr(model5c)
```

```
##  Groups         Name        Std.Dev. Corr
##  cntry:essround (Intercept) 15.5830
##                 CntryEduyrs  1.1553  -0.999
##  cntry          (Intercept) 15.6093
##  Residual                   15.7586
```

```r
anova(model5c)
```

```
## Type III Analysis of Variance Table with Satterthwaite's method
##             Sum Sq Mean Sq NumDF  DenDF F value    Pr(>F)
## CntryEduyrs  12852   12852     1 71.083  51.754 5.141e-10 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```r
ranova(model5c)
```

```
## ANOVA-like table for random-effects: Single term deletions
##
## Model:
## Trust ~ CntryEduyrs + (1 | cntry) + (1 + CntryEduyrs | cntry:essround)
##                                                      npar  logLik     AIC
## <none>                                                  7 -772525 1545064
## (1 | cntry)                                             6 -772641 1545294
## CntryEduyrs in (1 + CntryEduyrs | cntry:essround)       5 -772516 1545043
##                                                      LRT Df Pr(>Chisq)
## <none>
## (1 | cntry)                                          231.44  1     <2e-16 ***
## CntryEduyrs in (1 + CntryEduyrs | cntry:essround) -17.74  2          1
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```r
anova(model5a,model5b,model5c)
```

```
## Data: ds_filtrada1
## Models:
## model5a: Trust ~ CntryEduyrs + (1 | cntry) + (1 | cntry:essround)
## model5b: Trust ~ 1 + CntryEduyrs + (1 + CntryEduyrs | cntry) + (1 | cntry:essround)
## model5c: Trust ~ 1 + CntryEduyrs + (1 | cntry) + (1 + CntryEduyrs | cntry:essround)
##         Df     AIC     BIC  logLik deviance Chisq Chi Df Pr(>Chisq)
## model5a  5 1545043 1545093 -772516  1545033
## model5b  7 1545050 1545121 -772518  1545036     0      2          1
## model5c  7 1545064 1545135 -772525  1545050     0      0          1
```

```r
#HDI
model6a <- lmer(Trust ~ HDI +
                (1|cntry) +
                (1|cntry:essround),
              data=ds_filtrada1, REML=FALSE)
VarCorr(model6a)
```

```
##  Groups         Name        Std.Dev.
```

```
##  cntry:essround (Intercept)  1.3251
##  cntry          (Intercept)  5.6820
##  Residual                   15.7598
```

```
anova(model6a)
```

```
## Type III Analysis of Variance Table with Satterthwaite's method
##     Sum Sq Mean Sq NumDF  DenDF F value    Pr(>F)
## HDI  17363   17363     1 116.66  69.907 1.515e-13 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
ranova(model6a)
```

```
## ANOVA-like table for random-effects: Single term deletions
##
## Model:
## Trust ~ HDI + (1 | cntry) + (1 | cntry:essround)
##                       npar  logLik     AIC    LRT Df Pr(>Chisq)
## <none>                   5 -772511 1545032
## (1 | cntry)              4 -772597 1545201 170.96  1  < 2.2e-16 ***
## (1 | cntry:essround)     4 -772859 1545725 694.86  1  < 2.2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
model6b <- lmer(Trust ~ 1 + HDI +
                (1 + HDI|cntry) +
                (1       |cntry:essround),
             data=ds_filtrada1, REML=FALSE)
VarCorr(model6b)
```

```
##  Groups         Name        Std.Dev. Corr
##  cntry:essround (Intercept)  1.248
##  cntry          (Intercept) 30.967
##                 HDI         36.031   -0.984
##  Residual                   15.760
```

```
anova(model6b)
```

```
## Type III Analysis of Variance Table with Satterthwaite's method
##     Sum Sq Mean Sq NumDF  DenDF F value    Pr(>F)
## HDI  13026   13026     1 19.784  52.448 5.587e-07 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
ranova(model6b)
```

```
## ANOVA-like table for random-effects: Single term deletions
##
## Model:
## Trust ~ HDI + (1 + HDI | cntry) + (1 | cntry:essround)
##                           npar  logLik     AIC    LRT Df Pr(>Chisq)
## <none>                       7 -772510 1545035
## HDI in (1 + HDI | cntry)     5 -772511 1545032   1.70  2     0.4282
## (1 | cntry:essround)         6 -772685 1545382 349.36  1     <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
model6c <- lmer(Trust ~ 1 + HDI +
                  (1       |cntry) +
                  (1 + HDI|cntry:essround),
                data=ds_filtrada1, REML=FALSE)
```

```
## boundary (singular) fit: see ?isSingular
```

```
VarCorr(model6c)
```

```
##  Groups          Name        Std.Dev. Corr
##  cntry:essround (Intercept) 10.2688
##                 HDI         10.0762  -1.000
##  cntry          (Intercept)  5.3898
##  Residual                    15.7597
```

```
anova(model6c)
```

```
## Type III Analysis of Variance Table with Satterthwaite's method
##     Sum Sq Mean Sq NumDF  DenDF F value    Pr(>F)
## HDI  25095   25095     1 114.26  101.04 < 2.2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
ranova(model6c)
```

```
## ANOVA-like table for random-effects: Single term deletions
##
## Model:
## Trust ~ HDI + (1 | cntry) + (1 + HDI | cntry:essround)
##                                    npar  logLik     AIC     LRT Df
## <none>                                7 -772507 1545027
## (1 | cntry)                           6 -772595 1545203 177.060  1
## HDI in (1 + HDI | cntry:essround)     5 -772511 1545032   9.008  2
##                                    Pr(>Chisq)
## <none>
## (1 | cntry)                          < 2e-16 ***
## HDI in (1 + HDI | cntry:essround)    0.01106 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
anova(model6a,model6b,model6c)
```

```
## Data: ds_filtrada1
## Models:
## model6a: Trust ~ HDI + (1 | cntry) + (1 | cntry:essround)
## model6b: Trust ~ 1 + HDI + (1 + HDI | cntry) + (1 | cntry:essround)
## model6c: Trust ~ 1 + HDI + (1 | cntry) + (1 + HDI | cntry:essround)
##         Df     AIC     BIC  logLik deviance  Chisq Chi Df Pr(>Chisq)
## model6a  5 1545032 1545083 -772511  1545022
## model6b  7 1545035 1545106 -772510  1545021 1.6965      2     0.4282
## model6c  7 1545027 1545098 -772507  1545013 7.3118      0     <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
model7 <- lmer(Trust ~ 1 + agea + eduyrs + Benev + CntryEduyrs*gndrD + HDI +
                  (1 |cntry) +
                  (1 |cntry:essround),
```

```
              data=ds_filtrada1, REML=FALSE)
VarCorr(model7)
```

```
##  Groups          Name        Std.Dev.
##  cntry:essround (Intercept)  1.2539
##  cntry          (Intercept)  5.7334
##  Residual                    15.4793
```

```
anova(model7)
```

```
## Type III Analysis of Variance Table with Satterthwaite's method
##                    Sum Sq Mean Sq NumDF  DenDF   F value    Pr(>F)
## agea                27039   27039     1 184889  112.8455 < 2.2e-16 ***
## eduyrs             935891  935891     1 184820 3905.8986 < 2.2e-16 ***
## Benev              550427  550427     1 184714 2297.1830 < 2.2e-16 ***
## CntryEduyrs           198     198     1    111    0.8268  0.365175
## gndrD                1619    1619     1 184853    6.7578  0.009334 **
## HDI                  6361    6361     1    117   26.5464 1.053e-06 ***
## CntryEduyrs:gndrD    2024    2024     1 184854    8.4472  0.003657 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
ranova(model7)
```

```
## ANOVA-like table for random-effects: Single term deletions
##
## Model:
## Trust ~ agea + eduyrs + Benev + CntryEduyrs + gndrD + HDI + (1 |
##     cntry) + (1 | cntry:essround) + CntryEduyrs:gndrD
##                        npar  logLik     AIC    LRT Df Pr(>Chisq)
## <none>                   11 -769189 1538400
## (1 | cntry)              10 -769277 1538575 176.92  1  < 2.2e-16 ***
## (1 | cntry:essround)     10 -769502 1539024 625.95  1  < 2.2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
model8 <- lmer(Trust ~ 1 + gndrD + agea + eduyrs + Benev + CntryEduyrs + HDI +
                 (1|cntry) +
                 (1|cntry:essround),
               data=ds_filtrada1, REML=FALSE)
VarCorr(model8)
```

```
##  Groups          Name        Std.Dev.
##  cntry:essround (Intercept)  1.2544
##  cntry          (Intercept)  5.7318
##  Residual                    15.4797
```

```
anova(model8)
```

```
## Type III Analysis of Variance Table with Satterthwaite's method
##              Sum Sq Mean Sq NumDF  DenDF  F value    Pr(>F)
## gndrD          2563    2563     1 184840   10.694  0.001075 **
## agea          26921   26921     1 184890  112.350 < 2.2e-16 ***
## eduyrs       937162  937162     1 184820 3911.026 < 2.2e-16 ***
## Benev        551721  551721     1 184715 2302.477 < 2.2e-16 ***
## CntryEduyrs     320     320     1    110    1.336  0.250249
## HDI            6358    6358     1    117   26.532 1.059e-06 ***
```

```
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
ranova(model8)
```

```
## ANOVA-like table for random-effects: Single term deletions
##
## Model:
## Trust ~ gndrD + agea + eduyrs + Benev + CntryEduyrs + HDI + (1 |
##     cntry) + (1 | cntry:essround)
##                       npar  logLik     AIC    LRT Df Pr(>Chisq)
## <none>                  10 -769193 1538406
## (1 | cntry)              9 -769282 1538581 176.82  1  < 2.2e-16 ***
## (1 | cntry:essround)     9 -769506 1539031 626.11  1  < 2.2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
model9 <- lmer(Trust ~ 1 + gndrD + agea + eduyrs + Benev + CntryEduyrs + HDI +
                 (1|cntry) +
                 (1|cntry:essround),
               data=ds_filtrada1, REML=FALSE)
VarCorr(model9)
```

```
##  Groups          Name        Std.Dev.
##  cntry:essround (Intercept)  1.2544
##  cntry          (Intercept)  5.7318
##  Residual                    15.4797
```

```
anova(model9)
```

```
## Type III Analysis of Variance Table with Satterthwaite's method
##             Sum Sq Mean Sq NumDF  DenDF  F value    Pr(>F)
## gndrD         2563    2563     1 184840   10.694  0.001075 **
## agea         26921   26921     1 184890  112.350 < 2.2e-16 ***
## eduyrs      937162  937162     1 184820 3911.026 < 2.2e-16 ***
## Benev       551721  551721     1 184715 2302.477 < 2.2e-16 ***
## CntryEduyrs    320     320     1    110    1.336  0.250249
## HDI           6358    6358     1    117   26.532 1.059e-06 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
ranova(model9)
```

```
## ANOVA-like table for random-effects: Single term deletions
##
## Model:
## Trust ~ gndrD + agea + eduyrs + Benev + CntryEduyrs + HDI + (1 |
##     cntry) + (1 | cntry:essround)
##                       npar  logLik     AIC    LRT Df Pr(>Chisq)
## <none>                  10 -769193 1538406
## (1 | cntry)              9 -769282 1538581 176.82  1  < 2.2e-16 ***
## (1 | cntry:essround)     9 -769506 1539031 626.11  1  < 2.2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
modelGood <- lmer(Trust ~ 1 + agea + eduyrs + Benev + HDI +
                    (1|cntry) +
                    (1|cntry:essround),
```

```
              data=ds_filtrada1, REML=FALSE)

VarCorr(modelGood)
```

```
##  Groups          Name        Std.Dev.
##  cntry:essround (Intercept)  1.2609
##  cntry          (Intercept)  5.7830
##  Residual                    15.4801
```

```
anova(modelGood)
```

```
## Type III Analysis of Variance Table with Satterthwaite's method
##        Sum Sq Mean Sq NumDF  DenDF  F value    Pr(>F)
## agea    27289   27289     1 184890  113.879 < 2.2e-16 ***
## eduyrs 938621  938621     1 184916 3916.886 < 2.2e-16 ***
## Benev  565571  565571     1 184563 2360.141 < 2.2e-16 ***
## HDI     12256   12256     1    117   51.145 8.133e-11 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
ranova(modelGood)
```

```
## ANOVA-like table for random-effects: Single term deletions
##
## Model:
## Trust ~ agea + eduyrs + Benev + HDI + (1 | cntry) + (1 | cntry:essround)
##                       npar  logLik     AIC    LRT Df Pr(>Chisq)
## <none>                   8 -769199 1538414
## (1 | cntry)              7 -769289 1538592 179.95  1  < 2.2e-16 ***
## (1 | cntry:essround)     7 -769518 1539051 638.50  1  < 2.2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```