Structural equations modeling

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Index

Write a report on the analysis (10 pages not including appendices & references)

- Theoretical framing of the research problem / Research questions / Hypotheses
- Short description of the dataset used
- Modeling strategy
- Results

```
round <- c(8,9)

print(describeFast(ds),short=FALSE)
```

```
##
##  Number of observations =  410744 of which  67916   are complete cases.   Number of variables =  37
##          var  n.obs numeric factor logical character type
## ipshabt    1 394593   FALSE  FALSE   FALSE     FALSE   NA
## ipsuces    2 393872   FALSE  FALSE   FALSE     FALSE   NA
## iphlppl    3 395365   FALSE  FALSE   FALSE     FALSE   NA
## iplylfr    4 395290   FALSE  FALSE   FALSE     FALSE   NA
## ipfrule    5 393011   FALSE  FALSE   FALSE     FALSE   NA
## ipbhprp    6 394294   FALSE  FALSE   FALSE     FALSE   NA
## ipgdtim    7 393908   FALSE  FALSE   FALSE     FALSE   NA
## impfun     8 394926   FALSE  FALSE   FALSE     FALSE   NA
## imprich    9 395610   FALSE  FALSE   FALSE     FALSE   NA
## iprspot   10 393421   FALSE  FALSE   FALSE     FALSE   NA
## impsafe   11 395622   FALSE  FALSE   FALSE     FALSE   NA
## ipstrgv   12 392666   FALSE  FALSE   FALSE     FALSE   NA
## ipcrtiv   13 394262   FALSE  FALSE   FALSE     FALSE   NA
## impfree   14 395199   FALSE  FALSE   FALSE     FALSE   NA
## impdiff   15 394764   FALSE  FALSE   FALSE     FALSE   NA
## ipadvnt   16 394621   FALSE  FALSE   FALSE     FALSE   NA
## ipmodst   17 394827   FALSE  FALSE   FALSE     FALSE   NA
## imptrad   18 395413   FALSE  FALSE   FALSE     FALSE   NA
## ipeqopt   19 395179   FALSE  FALSE   FALSE     FALSE   NA
## ipudrst   20 394279   FALSE  FALSE   FALSE     FALSE   NA
## impenv    21 395158   FALSE  FALSE   FALSE     FALSE   NA
## cntry     22 410744   FALSE  FALSE   FALSE     FALSE   NA
## dweight   23 410744   FALSE  FALSE   FALSE     FALSE   NA
## pweight   24 410744   FALSE  FALSE   FALSE     FALSE   NA
## hhmmb     25 410122   FALSE  FALSE   FALSE     FALSE   NA
## gndr      26 410412   FALSE  FALSE   FALSE     FALSE   NA
## agea      27 408895   FALSE  FALSE   FALSE     FALSE   NA
## yrbrn     28 409082   FALSE  FALSE   FALSE     FALSE   NA
## lvgptnea  29 196691   FALSE  FALSE   FALSE     FALSE   NA
## dvrcdeva  30 223790   FALSE  FALSE   FALSE     FALSE   NA
## marsts    31 113484   FALSE  FALSE   FALSE     FALSE   NA
## chldhhe   32 252326   FALSE  FALSE   FALSE     FALSE   NA
```

```
## domicil   33 409620   FALSE  FALSE   FALSE     FALSE   NA
## eisced    34 409514   FALSE  FALSE   FALSE     FALSE   NA
## name      35 410744   FALSE  FALSE   FALSE     FALSE   NA
## essround  36 410744   FALSE  FALSE   FALSE     FALSE   NA
## idno      37 410744   FALSE  FALSE   FALSE     FALSE   NA
```

```
# describeBy(ds[cont],list(ds$essround %in% round,ds$cntry))
#
# for (j in round){
#   for (i in items){
#     print(paste(i,": ", var_lab(eval(parse(text=paste("ds$",i))))))
#     print(use_labels(mtcars[ds$essround == j,],
#                      table(eval(parse(text=paste("ds$",i))), ds$cntry,useNA = "ifany")))
#     print(use_labels(mtcars[ds$essround == j,],
#                      round(prop.table(table(eval(parse(text=paste("ds$",i))),ds$cntry),1)*100,2)))
#   }
# }

ds_filtrada <- ds %>% filter(essround %in% round)
ds_filtrada <- copy_labels(ds_filtrada, ds)
#Assign weight and survey stucture for ESS data
ds_filtrada %>% group_by(essround,cntry) %>%
  summarise(pesos=round(sum(dweight),0), n=n(), diff=n-pesos) %>%
  summarise(Diff_Pesos_N=sum(diff))
```

```
## # A tibble: 2 x 2
##   essround   Diff_Pesos_N
##   <labelled>        <dbl>
## 1 8                     0
## 2 9                     0
```

```
use_labels(ds_filtrada,table(gndr,as.character(cntry)))
```

```
##
## Gender   Austria Belgium Bulgaria Cyprus Czechia Estonia Finland France
##   Male      2054    1755      976    366    2146    1762    1809   1866
##   Female    2455    1778     1222    415    2521    2161    1871   2214
##
## Gender   Germany Hungary Iceland Ireland Israel Italy Lithuania
##   Male      2720    1395     434    2407   1227  2581       861
##   Female    2490    1917     440    2566   1330  2790      1261
##
## Gender   Netherlands Norway Poland Portugal   RS Russia Slovenia Spain
##   Male          1585   1607   1517      530  985   1037     1208   975
##   Female        1769   1344   1675      740 1058   1393     1417   983
##
## Gender   Sweden Switzerland United Kingdom
##   Male      773         1563           1870
##   Female    777         1504           2293
```

```
ds_filtrada$gndrD <- ifelse(ds_filtrada$gndr == 2, 0, ds_filtrada$gndr)

use_labels(ds_filtrada,table(marsts,as.character(cntry)))
```

```
##
## Legal marital status                                              Austria
```

```
##   Legally married                                                    77
##   In a legally registered civil union                                24
##   Legally separated                                                   0
##   Legally divorced/civil union dissolved                            691
##   Widowed/civil partner died                                        380
##   None of these (NEVER married or in legally registered civil union)   1252
##
## Legal marital status                                              Belgium
##   Legally married                                                    62
##   In a legally registered civil union                                 0
##   Legally separated                                                  29
##   Legally divorced/civil union dissolved                            326
##   Widowed/civil partner died                                        213
##   None of these (NEVER married or in legally registered civil union)   1257
##
## Legal marital status                                              Bulgaria
##   Legally married                                                    71
##   In a legally registered civil union                                 0
##   Legally separated                                                   0
##   Legally divorced/civil union dissolved                            154
##   Widowed/civil partner died                                        366
##   None of these (NEVER married or in legally registered civil union)    506
##
## Legal marital status                                              Cyprus
##   Legally married                                                    30
##   In a legally registered civil union                                 2
##   Legally separated                                                   0
##   Legally divorced/civil union dissolved                             66
##   Widowed/civil partner died                                         77
##   None of these (NEVER married or in legally registered civil union)   149
##
## Legal marital status                                              Czechia
##   Legally married                                                    52
##   In a legally registered civil union                                 9
##   Legally separated                                                 263
##   Legally divorced/civil union dissolved                            388
##   Widowed/civil partner died                                        418
##   None of these (NEVER married or in legally registered civil union)   1358
##
## Legal marital status                                              Estonia
##   Legally married                                                   100
##   In a legally registered civil union                                22
##   Legally separated                                                   0
##   Legally divorced/civil union dissolved                            525
##   Widowed/civil partner died                                        410
##   None of these (NEVER married or in legally registered civil union)   1355
##
## Legal marital status                                              Finland
##   Legally married                                                    67
##   In a legally registered civil union                                11
##   Legally separated                                                   0
##   Legally divorced/civil union dissolved                            438
##   Widowed/civil partner died                                        238
##   None of these (NEVER married or in legally registered civil union)   1211
```

```
##
## Legal marital status                                                  France
##   Legally married                                                        67
##   In a legally registered civil union                                    14
##   Legally separated                                                       0
##   Legally divorced/civil union dissolved                                560
##   Widowed/civil partner died                                            432
##   None of these (NEVER married or in legally registered civil union)   1270
##
## Legal marital status                                                 Germany
##   Legally married                                                       112
##   In a legally registered civil union                                     9
##   Legally separated                                                       0
##   Legally divorced/civil union dissolved                                416
##   Widowed/civil partner died                                            315
##   None of these (NEVER married or in legally registered civil union)   1617
##
## Legal marital status                                                 Hungary
##   Legally married                                                        69
##   In a legally registered civil union                                     3
##   Legally separated                                                       0
##   Legally divorced/civil union dissolved                                348
##   Widowed/civil partner died                                            474
##   None of these (NEVER married or in legally registered civil union)    882
##
## Legal marital status                                                 Iceland
##   Legally married                                                        11
##   In a legally registered civil union                                    36
##   Legally separated                                                       8
##   Legally divorced/civil union dissolved                                 77
##   Widowed/civil partner died                                             37
##   None of these (NEVER married or in legally registered civil union)    282
##
## Legal marital status                                                 Ireland
##   Legally married                                                       161
##   In a legally registered civil union                                    18
##   Legally separated                                                     147
##   Legally divorced/civil union dissolved                                196
##   Widowed/civil partner died                                            411
##   None of these (NEVER married or in legally registered civil union)   1638
##
## Legal marital status                                                 Israel
##   Legally married                                                        9
##   In a legally registered civil union                                    0
##   Legally separated                                                      0
##   Legally divorced/civil union dissolved                               215
##   Widowed/civil partner died                                           173
##   None of these (NEVER married or in legally registered civil union)   577
##
## Legal marital status                                                 Italy
##   Legally married                                                      108
##   In a legally registered civil union                                   36
##   Legally separated                                                    146
##   Legally divorced/civil union dissolved                               178
```

```
##   Widowed/civil partner died                                          430
##   None of these (NEVER married or in legally registered civil union)  1714
##
## Legal marital status                                                Lithuania
##   Legally married                                                          13
##   In a legally registered civil union                                       0
##   Legally separated                                                         6
##   Legally divorced/civil union dissolved                                  254
##   Widowed/civil partner died                                              339
##   None of these (NEVER married or in legally registered civil union)      445
##
## Legal marital status                                                Netherlands
##   Legally married                                                          28
##   In a legally registered civil union                                      46
##   Legally separated                                                         7
##   Legally divorced/civil union dissolved                                  327
##   Widowed/civil partner died                                              226
##   None of these (NEVER married or in legally registered civil union)     1033
##
## Legal marital status                                                Norway
##   Legally married                                                          44
##   In a legally registered civil union                                      28
##   Legally separated                                                        43
##   Legally divorced/civil union dissolved                                  294
##   Widowed/civil partner died                                              108
##   None of these (NEVER married or in legally registered civil union)     1131
##
## Legal marital status                                                Poland
##   Legally married                                                          35
##   In a legally registered civil union                                       0
##   Legally separated                                                         3
##   Legally divorced/civil union dissolved                                  180
##   Widowed/civil partner died                                              318
##   None of these (NEVER married or in legally registered civil union)      863
##
## Legal marital status                                                Portugal
##   Legally married                                                          37
##   In a legally registered civil union                                       0
##   Legally separated                                                         5
##   Legally divorced/civil union dissolved                                   24
##   Widowed/civil partner died                                                1
##   None of these (NEVER married or in legally registered civil union)       63
##
## Legal marital status                                                     RS
##   Legally married                                                        81
##   In a legally registered civil union                                     0
##   Legally separated                                                       0
##   Legally divorced/civil union dissolved                                187
##   Widowed/civil partner died                                            393
##   None of these (NEVER married or in legally registered civil union)    443
##
## Legal marital status                                                Russia
##   Legally married                                                          35
##   In a legally registered civil union                                       0
```

```
##   Legally separated                                                    0
##   Legally divorced/civil union dissolved                             376
##   Widowed/civil partner died                                         365
##   None of these (NEVER married or in legally registered civil union)  597
##
## Legal marital status                                              Slovenia
##   Legally married                                                       32
##   In a legally registered civil union                                    3
##   Legally separated                                                      0
##   Legally divorced/civil union dissolved                               126
##   Widowed/civil partner died                                           233
##   None of these (NEVER married or in legally registered civil union)   968
##
## Legal marital status                                                Spain
##   Legally married                                                     29
##   In a legally registered civil union                                  0
##   Legally separated                                                   26
##   Legally divorced/civil union dissolved                             110
##   Widowed/civil partner died                                         128
##   None of these (NEVER married or in legally registered civil union) 610
##
## Legal marital status                                               Sweden
##   Legally married                                                     23
##   In a legally registered civil union                                 20
##   Legally separated                                                    0
##   Legally divorced/civil union dissolved                             157
##   Widowed/civil partner died                                          94
##   None of these (NEVER married or in legally registered civil union) 498
##
## Legal marital status                                          Switzerland
##   Legally married                                                    52
##   In a legally registered civil union                                 1
##   Legally separated                                                  35
##   Legally divorced/civil union dissolved                            262
##   Widowed/civil partner died                                        124
##   None of these (NEVER married or in legally registered civil union) 989
##
## Legal marital status                                       United Kingdom
##   Legally married                                                   275
##   In a legally registered civil union                                15
##   Legally separated                                                   0
##   Legally divorced/civil union dissolved                            493
##   Widowed/civil partner died                                        433
##   None of these (NEVER married or in legally registered civil union) 1208
```

```
marstsD <- as.dichotomy(ds_filtrada$marsts, prefix="marsts")
names(marstsD)
```

```
## [1] "marsts1" "marsts2" "marsts3" "marsts4" "marsts5" "marsts6"
```

```
use_labels(ds_filtrada,table(eisced,as.character(cntry)))
```

```
##
## Highest level of education, ES - ISCED               Austria Belgium
##   ES-ISCED I , less than lower secondary                  58     331
```

```
##   ES-ISCED II, lower secondary                              689     632
##   ES-ISCED IIIb, lower tier upper secondary                2350     229
##   ES-ISCED IIIa, upper tier upper secondary                 267     805
##   ES-ISCED IV, advanced vocational, sub-degree              540     281
##   ES-ISCED V1, lower tertiary education, BA level           226     704
##   ES-ISCED V2, higher tertiary education, >= MA level       368     529
##   Other                                                       5      15
##
## Highest level of education, ES - ISCED                 Bulgaria Cyprus
##   ES-ISCED I , less than lower secondary                    153     187
##   ES-ISCED II, lower secondary                              513      65
##   ES-ISCED IIIb, lower tier upper secondary                   0       2
##   ES-ISCED IIIa, upper tier upper secondary                1038     228
##   ES-ISCED IV, advanced vocational, sub-degree               34      63
##   ES-ISCED V1, lower tertiary education, BA level           166     160
##   ES-ISCED V2, higher tertiary education, >= MA level       293      76
##   Other                                                       0       0
##
## Highest level of education, ES - ISCED                 Czechia Estonia
##   ES-ISCED I , less than lower secondary                    113      98
##   ES-ISCED II, lower secondary                              541     598
##   ES-ISCED IIIb, lower tier upper secondary                1298     109
##   ES-ISCED IIIa, upper tier upper secondary                1383    1294
##   ES-ISCED IV, advanced vocational, sub-degree              639     693
##   ES-ISCED V1, lower tertiary education, BA level           171     457
##   ES-ISCED V2, higher tertiary education, >= MA level       517     672
##   Other                                                       0       1
##
## Highest level of education, ES - ISCED                 Finland France
##   ES-ISCED I , less than lower secondary                    397     665
##   ES-ISCED II, lower secondary                              320     330
##   ES-ISCED IIIb, lower tier upper secondary                   0    1011
##   ES-ISCED IIIa, upper tier upper secondary                1210     722
##   ES-ISCED IV, advanced vocational, sub-degree              623     570
##   ES-ISCED V1, lower tertiary education, BA level           573     194
##   ES-ISCED V2, higher tertiary education, >= MA level       548     582
##   Other                                                       4       0
##
## Highest level of education, ES - ISCED                 Germany Hungary
##   ES-ISCED I , less than lower secondary                    146      80
##   ES-ISCED II, lower secondary                              490     582
##   ES-ISCED IIIb, lower tier upper secondary                1915     988
##   ES-ISCED IIIa, upper tier upper secondary                 233     955
##   ES-ISCED IV, advanced vocational, sub-degree             1075     239
##   ES-ISCED V1, lower tertiary education, BA level           532     336
##   ES-ISCED V2, higher tertiary education, >= MA level       792     119
##   Other                                                       0       0
##
## Highest level of education, ES - ISCED                 Iceland Ireland
##   ES-ISCED I , less than lower secondary                     14     632
##   ES-ISCED II, lower secondary                              235     848
##   ES-ISCED IIIb, lower tier upper secondary                 113     270
##   ES-ISCED IIIa, upper tier upper secondary                  98     695
##   ES-ISCED IV, advanced vocational, sub-degree              117    1191
```

```
##   ES-ISCED V1, lower tertiary education, BA level         160     725
##   ES-ISCED V2, higher tertiary education, >= MA level     134     586
##   Other                                                     4      12
##
## Highest level of education, ES - ISCED                Israel Italy
##   ES-ISCED I , less than lower secondary                 182   734
##   ES-ISCED II, lower secondary                           158  1703
##   ES-ISCED IIIb, lower tier upper secondary              504   375
##   ES-ISCED IIIa, upper tier upper secondary              529  1699
##   ES-ISCED IV, advanced vocational, sub-degree           355   133
##   ES-ISCED V1, lower tertiary education, BA level        510   202
##   ES-ISCED V2, higher tertiary education, >= MA level    309   475
##   Other                                                    4    14
##
## Highest level of education, ES - ISCED                Lithuania
##   ES-ISCED I , less than lower secondary                     98
##   ES-ISCED II, lower secondary                              259
##   ES-ISCED IIIb, lower tier upper secondary                 109
##   ES-ISCED IIIa, upper tier upper secondary                 717
##   ES-ISCED IV, advanced vocational, sub-degree              357
##   ES-ISCED V1, lower tertiary education, BA level           310
##   ES-ISCED V2, higher tertiary education, >= MA level       268
##   Other                                                       0
##
## Highest level of education, ES - ISCED                Netherlands Norway
##   ES-ISCED I , less than lower secondary                      236     42
##   ES-ISCED II, lower secondary                                839    432
##   ES-ISCED IIIb, lower tier upper secondary                   748    566
##   ES-ISCED IIIa, upper tier upper secondary                   255    350
##   ES-ISCED IV, advanced vocational, sub-degree                202    358
##   ES-ISCED V1, lower tertiary education, BA level             392    663
##   ES-ISCED V2, higher tertiary education, >= MA level         661    526
##   Other                                                        17     10
##
## Highest level of education, ES - ISCED                Poland Portugal   RS
##   ES-ISCED I , less than lower secondary                  63      455  193
##   ES-ISCED II, lower secondary                          1276      219  366
##   ES-ISCED IIIb, lower tier upper secondary              289        0  394
##   ES-ISCED IIIa, upper tier upper secondary              670      252  633
##   ES-ISCED IV, advanced vocational, sub-degree           155       51  171
##   ES-ISCED V1, lower tertiary education, BA level        197       98  204
##   ES-ISCED V2, higher tertiary education, >= MA level    529      184   71
##   Other                                                    0        8    7
##
## Highest level of education, ES - ISCED                Russia Slovenia
##   ES-ISCED I , less than lower secondary                  46       59
##   ES-ISCED II, lower secondary                           215      481
##   ES-ISCED IIIb, lower tier upper secondary                0      494
##   ES-ISCED IIIa, upper tier upper secondary              544      886
##   ES-ISCED IV, advanced vocational, sub-degree           822      175
##   ES-ISCED V1, lower tertiary education, BA level         61      416
##   ES-ISCED V2, higher tertiary education, >= MA level    742      106
##   Other                                                    0        2
##
```

```
## Highest level of education, ES - ISCED                Spain Sweden
##   ES-ISCED I , less than lower secondary                461    136
##   ES-ISCED II, lower secondary                          550    145
##   ES-ISCED IIIb, lower tier upper secondary             181    169
##   ES-ISCED IIIa, upper tier upper secondary             126    312
##   ES-ISCED IV, advanced vocational, sub-degree          202    371
##   ES-ISCED V1, lower tertiary education, BA level       182    177
##   ES-ISCED V2, higher tertiary education, >= MA level   253    231
##   Other                                                   0      6
##
## Highest level of education, ES - ISCED                Switzerland
##   ES-ISCED I , less than lower secondary                       92
##   ES-ISCED II, lower secondary                                564
##   ES-ISCED IIIb, lower tier upper secondary                  1031
##   ES-ISCED IIIa, upper tier upper secondary                   243
##   ES-ISCED IV, advanced vocational, sub-degree                501
##   ES-ISCED V1, lower tertiary education, BA level             219
##   ES-ISCED V2, higher tertiary education, >= MA level         405
##   Other                                                         5
##
## Highest level of education, ES - ISCED                United Kingdom
##   ES-ISCED I , less than lower secondary                         777
##   ES-ISCED II, lower secondary                                   462
##   ES-ISCED IIIb, lower tier upper secondary                      366
##   ES-ISCED IIIa, upper tier upper secondary                      569
##   ES-ISCED IV, advanced vocational, sub-degree                   708
##   ES-ISCED V1, lower tertiary education, BA level                577
##   ES-ISCED V2, higher tertiary education, >= MA level            595
##   Other                                                           79
```

```
# ds_filtrada$eiscedT <- ifelse(ds_filtrada$eisced %in% c(1,2,3) , 1,
#                               ifelse(ds_filtrada$eisced %in% c(4,5),2,
#                                      ifelse(ds_filtrada$eisced %in% c(6,7), 3,NA)))
# val_lab(ds_filtrada$eiscedT) = num_lab("
#             1 Less than Upper secondary
#             2 Upper secondary or vocational
#             3 Bachelor or higher
# ")
eiscedD <- as.dichotomy(ds_filtrada$eisced, prefix="eisced")
names(eiscedD)
```

```
## [1] "eisced1"  "eisced2"  "eisced3"  "eisced4"  "eisced5"  "eisced6"
## [7] "eisced7"  "eisced55"
```

```
use_labels(ds_filtrada,table(domicil,as.character(cntry)))
```

```
##
## Domicile, respondent's description Austria Belgium Bulgaria Cyprus Czechia
##   A big city                          1012     562      795    231    1542
##   Suburbs or outskirts of big city     358     310       31    188     179
##   Town or small city                  1085     871      664    117    1510
##   Country village                     1846    1610      706    245    1398
##   Farm or home in countryside          208     180        2      0      38
##
## Domicile, respondent's description Estonia Finland France Germany Hungary
```

```
##   A big city                           1180     866    682     787     807
##   Suburbs or outskirts of big city      369     438    512     778     179
##   Town or small city                   1246    1077   1441    1925    1219
##   Country village                       887     616   1189    1598    1088
##   Farm or home in countryside           240     679    255     121      18
##
## Domicile, respondent's description Iceland Ireland Israel Italy Lithuania
##   A big city                           106     428   1534   628       878
##   Suburbs or outskirts of big city     209    1016    270   322         9
##   Town or small city                   431    1444    418  1880       746
##   Country village                       95     677    329  2334       484
##   Farm or home in countryside           36    1401      6   195         5
##
## Domicile, respondent's description Netherlands Norway Poland Portugal   RS
##   A big city                               633    452    655      256  578
##   Suburbs or outskirts of big city         312    494     85      200  312
##   Town or small city                       879    915   1021      425  425
##   Country village                         1369    563   1401      359  718
##   Farm or home in countryside              161    522     25       28   10
##
## Domicile, respondent's description Russia Slovenia Spain Sweden
##   A big city                          1008      318   385    208
##   Suburbs or outskirts of big city      59      289   107    298
##   Town or small city                   795      573   536    604
##   Country village                      539     1263   878    267
##   Farm or home in countryside           21      178    48    167
##
## Domicile, respondent's description Switzerland United Kingdom
##   A big city                               259            373
##   Suburbs or outskirts of big city         243            817
##   Town or small city                       851           1893
##   Country village                         1594            900
##   Farm or home in countryside              120            176
```

```
domicilD <- as.dichotomy(ds_filtrada$domicil, prefix="domicil")
names(domicilD)
```

```
## [1] "domicil1" "domicil2" "domicil3" "domicil4" "domicil5"
```

```
use_labels(ds_filtrada,table(chldhhe,as.character(cntry)))
```

```
##
## Ever had children living in household Austria Belgium Bulgaria Cyprus
##                                  Yes    1688    1006      997    288
##                                  No     1517    1161      439    181
##
## Ever had children living in household Czechia Estonia Finland France
##                                  Yes    1803    1607    1433   1747
##                                  No     1582     972    1216   1132
##
## Ever had children living in household Germany Hungary Iceland Ireland
##                                  Yes    1757    1234     268    1293
##                                  No     1808    1105     207    1791
##
## Ever had children living in household Israel Italy Lithuania Netherlands
```

```
##                                  Yes    628  1170       952        1074
##                                  No     672  2258       477        1183
##
## Ever had children living in household Norway Poland Portugal   RS Russia
##                                  Yes    983    911      610  795    866
##                                  No     917    918      298  535    713
##
## Ever had children living in household Slovenia Spain Sweden Switzerland
##                                  Yes      760   431    627         791
##                                  No       692   631    432        1229
##
## Ever had children living in household United Kingdom
##                                  Yes           1598
##                                  No            1220
```

```
ds_filtrada$chldhheD <- ifelse(ds_filtrada$chldhhe == 2, 0, ds_filtrada$chldhhe)

use_labels(ds_filtrada,table(lvgptnea,as.character(cntry)))
```

```
##
## Ever lived with a partner, without being married Austria Belgium Bulgaria
##                                             Yes    2245     855      425
##                                             No     1817    2115     1616
##
## Ever lived with a partner, without being married Cyprus Czechia Estonia
##                                             Yes    259    1651    1476
##                                             No     491    2489    1673
##
## Ever lived with a partner, without being married Finland France Germany
##                                             Yes    1625   1671    1941
##                                             No     1477   1995    2669
##
## Ever lived with a partner, without being married Hungary Iceland Ireland
##                                             Yes     719     358    1316
##                                             No     2248     352    3241
##
## Ever lived with a partner, without being married Israel Italy Lithuania
##                                             Yes    395   886       402
##                                             No    2064  4102      1547
##
## Ever lived with a partner, without being married Netherlands Norway Poland
##                                             Yes         1110   1159    567
##                                             No          1859   1205   2426
##
## Ever lived with a partner, without being married Portugal   RS Russia
##                                             Yes      227  681    682
##                                             No       909 1273   1536
##
## Ever lived with a partner, without being married Slovenia Spain Sweden
##                                             Yes      686   416    672
##                                             No      1490  1357    600
##
## Ever lived with a partner, without being married Switzerland
##                                             Yes         1089
##                                             No          1632
```

```
##
## Ever lived with a partner, without being married United Kingdom
##                                                 Yes           1637
##                                                 No            2085
```

```
ds_filtrada$lvgptneaD <- ifelse(ds_filtrada$lvgptnea == 2, 0, ds_filtrada$lvgptnea)

ds_filtrada <- cbind(ds_filtrada, eiscedD, marstsD, domicilD)
ds_filtrada <- ds_filtrada[,!colnames(ds_filtrada) %in% c("eisced55")]
```

```
table(ds_filtrada$cntry,ds_filtrada$essround)
```

```
##
##                    8    9
##   Austria        2010 2499
##   Belgium        1766 1767
##   Bulgaria          0 2198
##   Croatia           0    0
##   Cyprus            0  781
##   Czechia        2269 2398
##   Denmark           0    0
##   Estonia        2019 1904
##   Finland        1925 1755
##   France         2070 2010
##   Germany        2852 2358
##   Greece            0    0
##   Hungary        1614 1698
##   Iceland         880    0
##   Ireland        2757 2216
##   Israel         2557    0
##   Italy          2626 2745
##   Lithuania      2122    0
##   Luxembourg        0    0
##   Netherlands    1681 1673
##   Norway         1545 1406
##   Poland         1694 1500
##   Portugal       1270    0
##   RS                0 2043
##   Russia         2430    0
##   Slovakia          0    0
##   Slovenia       1307 1318
##   Spain          1958    0
##   Sweden         1551    0
##   Switzerland    1525 1542
##   Turkey            0    0
##   Ukraine           0    0
##   United Kingdom 1959 2204
```

```
countries <- c("Austria","Belgium","Czechia","Estonia","France","Germany",
               "Ireland","Italy","Netherlands","Norway","Poland","Slovenia","Switzerland","United Kingdo
#"Hungary", "Finland"
ds_filtradaAll <- ds_filtrada %>% filter(cntry %in% countries)
table(as_character(ds_filtradaAll$cntry),ds_filtradaAll$essround)
```

```
##
##                    8    9
```

```
##   Austria        2010 2499
##   Belgium        1766 1767
##   Czechia        2269 2398
##   Estonia        2019 1904
##   France         2070 2010
##   Germany        2852 2358
##   Ireland        2757 2216
##   Italy          2626 2745
##   Netherlands    1681 1673
##   Norway         1545 1406
##   Poland         1694 1500
##   Slovenia       1307 1318
##   Switzerland    1525 1542
##   United Kingdom 1959 2204
```

```
model1<-'
achie =~ ipshabt + ipsuces
benev =~ iphlppl + iplylfr
confo =~ ipfrule + ipbhprp
hedon =~ ipgdtim + impfun
power =~ imprich + iprspot
secur =~ impsafe + ipstrgv
selfd =~ ipcrtiv + impfree
stimu =~ impdiff + ipadvnt
tradi =~ ipmodst + imptrad
unive =~ ipeqopt + ipudrst +impenv'

for (r in c(8,9)) {
  ds_filtrada <- ds_filtradaAll %>% filter(essround == r)
  survey.design <- svydesign(ids=~idno, prob=~dweight, data=ds_filtrada)

  lavaan.fit1 <- lavaan(model1, data=ds_filtrada, auto.fix.first=TRUE,
                        auto.var=TRUE, int.ov.free=TRUE,
                        auto.cov.lv.x=TRUE, estimator="MLM",
                        cluster = "cntry", meanstructure=TRUE)

  survey.fit1 <- lavaan.survey(lavaan.fit=lavaan.fit1,survey.design=survey.design)
  print(paste("ESS round: ", r))
  print(fitMeasures(survey.fit1, c("cfi", "rmsea", "srmr")))
  print(modindices(survey.fit1,sort=T)[1:10,])
}
```

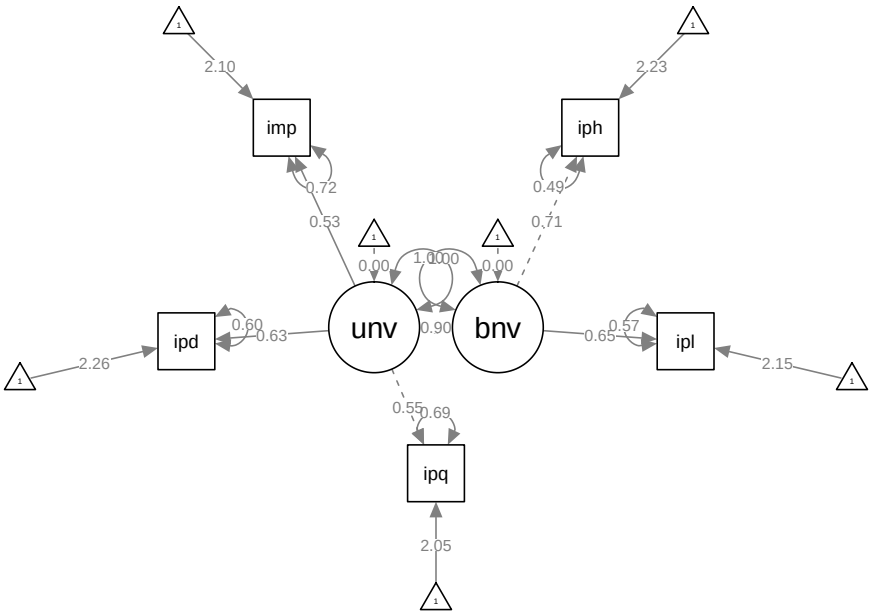
```
## [1] "ESS round:  8"
##   cfi rmsea  srmr
## 0.902 0.058 0.049
##       lhs op     rhs       mi    epc sepc.lv sepc.all sepc.nox
## 173 confo =~ imprich 2635.432 -0.869  -0.680   -0.527   -0.527
## 289 tradi =~ imprich 2510.648 -0.966  -0.522   -0.405   -0.405
## 174 confo =~ iprspot 2510.041  0.951   0.743    0.550    0.550
## 290 tradi =~ iprspot 2442.709  1.065   0.575    0.426    0.426
## 232 secur =~ imprich 1908.016 -0.679  -0.562   -0.436   -0.436
## 314 unive =~ impdiff 1850.133  0.740   0.426    0.319    0.319
## 315 unive =~ ipadvnt 1832.963 -0.846  -0.487   -0.343   -0.343
## 233 secur =~ iprspot 1822.581  0.742   0.614    0.454    0.454
## 256 selfd =~ ipadvnt 1790.034 -1.182  -0.811   -0.571   -0.571
```

```
## 255 selfd =~ impdiff 1763.892  1.020   0.700    0.524    0.524
## [1] "ESS round:  9"
##   cfi rmsea  srmr
## 0.900 0.058 0.048
##       lhs op     rhs       mi    epc sepc.lv sepc.all sepc.nox
## 289 tradi =~ imprich 2455.685 -0.871  -0.468   -0.384   -0.384
## 173 confo =~ imprich 2411.447 -0.834  -0.589   -0.484   -0.484
## 290 tradi =~ iprspot 2247.085  1.023   0.549    0.402    0.402
## 174 confo =~ iprspot 2224.435  0.983   0.694    0.508    0.508
## 232 secur =~ imprich 1779.921 -0.623  -0.499   -0.410   -0.410
## 233 secur =~ iprspot 1763.434  0.752   0.602    0.441    0.441
## 314 unive =~ impdiff 1356.475  0.691   0.375    0.280    0.280
## 154 benev =~ imprich 1353.931 -0.550  -0.368   -0.303   -0.303
## 155 benev =~ iprspot 1348.768  0.671   0.449    0.329    0.329
## 315 unive =~ ipadvnt 1305.687 -0.781  -0.424   -0.297   -0.297
```

```
model3<-'
benev =~ iphlppl + iplylfr
unive =~ ipeqopt + ipudrst +impenv
benev ~~ unive
'
for (r in c(8,9)) {
  ds_filtrada <- ds_filtradaAll %>% filter(essround == r)
  survey.design <- svydesign(ids=~idno, prob=~dweight, data=ds_filtrada)

  lavaan.fit3 <- lavaan(model3, data=ds_filtrada, auto.fix.first=TRUE,
                        auto.var=TRUE, int.ov.free=TRUE,
                        auto.cov.lv.x=TRUE,estimator="MLM",
                        cluster = "cntry", meanstructure=TRUE)
  survey.fit3 <- lavaan.survey(lavaan.fit=lavaan.fit3,survey.design=survey.design)
  assign(paste0("survey.fit3r",r),survey.fit3)

  print(paste("ESS round: ", r))
  print(fitMeasures(survey.fit3, c("cfi", "rmsea", "srmr")))
  print(modindices(survey.fit3,sort=T)[1:10,])

  cov <- round(cov(ds_filtrada[,items], use="complete.obs"),3)
  print(lowerMat(cov, digits=3))
  print(round(colMeans(ds_filtrada[,items], na.rm = TRUE),3))
  print(fitted(survey.fit3))
  invisible(semPaths(survey.fit3,"model","stand", layout = "circle", rainbowStart = 0.8))
}
```

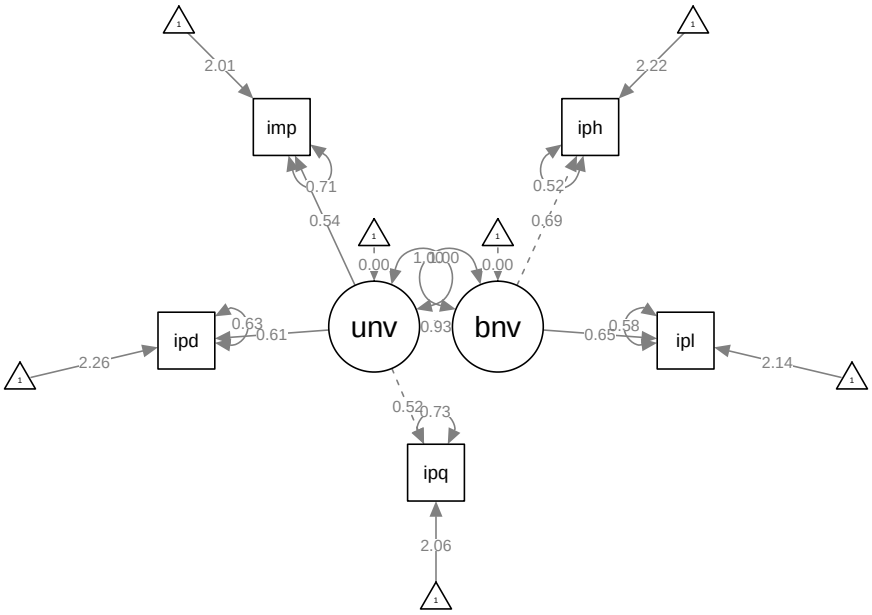
```
## [1] "ESS round:  8"
##   cfi rmsea  srmr
## 0.990 0.047 0.014
##        lhs op     rhs      mi    epc sepc.lv sepc.all sepc.nox
## 32 iplylfr ~~  impenv 166.589  0.065   0.065    0.109    0.109
## 21   benev =~ ipeqopt 130.387 -0.830  -0.583   -0.543   -0.543
## 35 ipudrst ~~  impenv 130.387 -0.075  -0.075   -0.106   -0.106
## 23   benev =~  impenv  91.091  0.634   0.445    0.431    0.431
## 33 ipeqopt ~~ ipudrst  91.091  0.068   0.068    0.094    0.094
## 30 iplylfr ~~ ipeqopt  64.763 -0.043  -0.043   -0.070   -0.070
## 28 iphlppl ~~ ipudrst  29.456  0.034   0.034    0.060    0.060
## 31 iplylfr ~~ ipudrst  17.367 -0.023  -0.023   -0.041   -0.041
```

```
## 29 iphlppl ~~  impenv  12.375 -0.020  -0.020   -0.033   -0.033
## 27 iphlppl ~~ ipeqopt   5.289 -0.014  -0.014   -0.022   -0.022
##         iphlpp iplylf ipeqpt ipdrst impenv
## iphlppl 0.944
## iplylfr 0.401  0.791
## ipeqopt 0.354  0.276  1.124
## ipudrst 0.409  0.329  0.398  1.069
## impenv  0.332  0.318  0.321  0.318  1.052
##  [1] 0.401 0.354 0.409 0.332 0.276 0.329 0.318 0.398 0.321 0.318
## iphlppl iplylfr ipeqopt ipudrst  impenv
##   2.187   1.938   2.194   2.355   2.173
## $cov
##         iphlpp iplylf ipeqpt ipdrst impenv
## iphlppl 0.969
## iplylfr 0.413  0.814
## ipeqopt 0.375  0.314  1.154
## ipudrst 0.415  0.347  0.390  1.091
## impenv  0.345  0.289  0.324  0.358  1.069
##
## $mean
## iphlppl iplylfr ipeqopt ipudrst  impenv
##   2.192   1.938   2.203   2.358   2.170
```




```
## [1] "ESS round:  9"
##   cfi rmsea  srmr
## 0.985 0.058 0.017
##        lhs op     rhs      mi    epc sepc.lv sepc.all sepc.nox
```

```
## 32 iplylfr ~~  impenv 343.794  0.093   0.093    0.166    0.166
## 33 ipeqopt ~~ ipudrst 135.389  0.079   0.079    0.107    0.107
## 23   benev =~  impenv 135.388  1.202   0.807    0.815    0.815
## 30 iplylfr ~~ ipeqopt  94.716 -0.051  -0.051   -0.085   -0.085
## 35 ipudrst ~~  impenv  86.516 -0.061  -0.061   -0.089   -0.089
## 21   benev =~ ipeqopt  86.515 -0.983  -0.660   -0.625   -0.625
## 31 iplylfr ~~ ipudrst  72.357 -0.047  -0.047   -0.086   -0.086
## 29 iphlppl ~~  impenv  58.934 -0.043  -0.043   -0.074   -0.074
## 28 iphlppl ~~ ipudrst  40.168  0.040   0.040    0.069    0.069
## 22   benev =~ ipudrst   5.674 -0.304  -0.204   -0.198   -0.198
##         iphlpp iplylf ipeqpt ipdrst impenv
## iphlppl 0.917
## iplylfr 0.373  0.763
## ipeqopt 0.337  0.257  1.100
## ipudrst 0.389  0.306  0.366  1.044
## impenv  0.315  0.321  0.280  0.305  0.974
##  [1] 0.373 0.337 0.389 0.315 0.257 0.306 0.321 0.366 0.280 0.305
## iphlppl iplylfr ipeqopt ipudrst  impenv
##   2.153   1.901   2.179   2.333   2.004
## $cov
##         iphlpp iplylf ipeqpt ipdrst impenv
## iphlppl 0.938
## iplylfr 0.386  0.781
## ipeqopt 0.344  0.294  1.116
## ipudrst 0.392  0.335  0.347  1.065
## impenv  0.334  0.285  0.295  0.337  0.981
##
## $mean
## iphlppl iplylfr ipeqopt ipudrst  impenv
##   2.152   1.895   2.174   2.334   1.993
```




```
for (r in c(8,9)) {
  ds_filtrada <- ds_filtradaAll %>% filter(essround == r)
  survey.design <- svydesign(ids=~idno, prob=~dweight, data=ds_filtrada)

  # 1. CONFIGURAL EQUIVALENCE
  ## Add the "meanstructure" argument to add means/intercepts
  lavaan.conffit3 <- lavaan(model3, data=ds_filtrada,
                            auto.fix.first=TRUE,  #factor loading of first indicator set to 1
                            int.ov.free=TRUE,     #intercepts not fixed to 0
                            meanstructure=TRUE,   #the means of the observed variables enter the model,
                            auto.var=TRUE,        #residual variances and variances of exogeneous laten
                            auto.cov.lv.x=TRUE,   #covariances of exogeneous latent variables are inclu
                            estimator="MLM",
                            group = "cntry",
                            group.label = countries
                            #group.equal = ...    #vector for multigroup analysis specify the pattern o
                            )
  survey.conffit3 <- lavaan.survey(lavaan.fit=lavaan.conffit3,survey.design=survey.design)
  assign(paste0("survey.conffit3r",r),survey.conffit3)
  # 2. METRIC EQUIVALENCE: set the factor loadings equal across groups

  lavaan.metrfit3 <- lavaan(model3, data=ds_filtrada,
                           auto.fix.first=TRUE,  #factor loading of first indicator set to 1
                           int.ov.free=TRUE,     #intercepts not fixed to 0
                           meanstructure=TRUE,   #the means of the observed variables enter the model, n
                           auto.var=TRUE,        #residual variances and variances of exogeneous latent
```

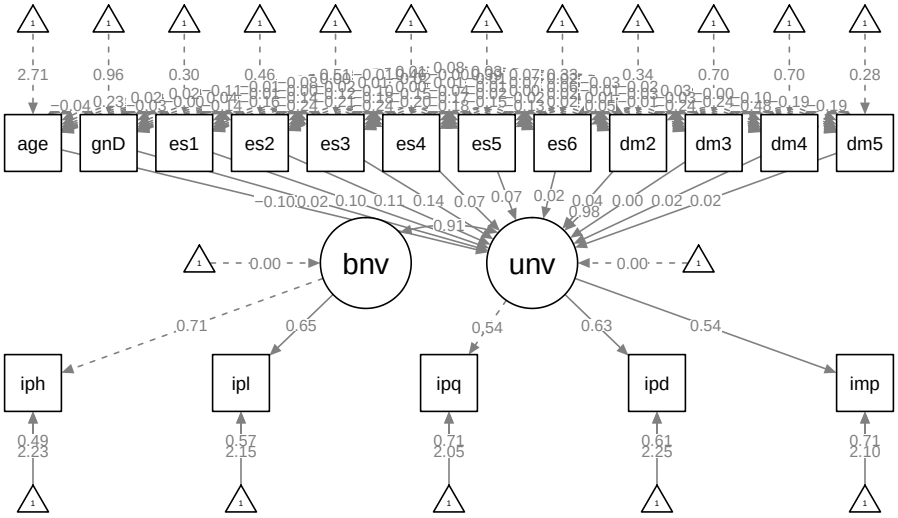
```
                          auto.cov.lv.x=TRUE,   #covariances of exogeneous latent variables are include
                          estimator="MLM",
                          group = "cntry",
                          group.label = countries,
                          group.equal=c("loadings") #vector for multigroup analysis specify the pattern
                          )
  survey.metrfit3 <- lavaan.survey(lavaan.fit=lavaan.metrfit3,survey.design=survey.design)

  # 3. SCALAR EQUIVALENCE: set the factor loadings and the intercepts equal across groups

  lavaan.scalfit3 <- lavaan(model3, data=ds_filtrada,
                          auto.fix.first=TRUE,  #factor loading of first indicator set to 1
                          int.ov.free=TRUE,     #intercepts not fixed to 0
                          meanstructure=TRUE,   #the means of the observed variables enter the model, n
                          auto.var=TRUE,        #residual variances and variances of exogeneous latent
                          auto.cov.lv.x=TRUE,   #covariances of exogeneous latent variables are include
                          estimator="MLM",
                          group = "cntry",
                          group.label = countries,
                          group.equal=c("loadings","intercepts"))
  survey.scalfit3 <- lavaan.survey(lavaan.fit=lavaan.scalfit3,survey.design=survey.design)


  # 4. check whether factor variances are equal across groups
  lavaan.varianfit3 <- lavaan(model3, data=ds_filtrada,
                          auto.fix.first=TRUE,  #factor loading of first indicator set to 1
                          int.ov.free=TRUE,     #intercepts not fixed to 0
                          meanstructure=TRUE,   #the means of the observed variables enter the model, n
                          auto.var=TRUE,        #residual variances and variances of exogeneous latent
                          auto.cov.lv.x=TRUE,   #covariances of exogeneous latent variables are include
                          estimator="MLM",
                          group = "cntry",
                          group.label = countries,
                          group.equal=c("loadings","intercepts","lv.variances"))
  survey.varianfit3 <- lavaan.survey(lavaan.fit=lavaan.varianfit3,survey.design=survey.design)


  invar <- data.frame(round(rbind(Configural = fitMeasures(survey.conffit3, c("cfi", "rmsea", "srmr")),
  Metric = fitMeasures(survey.metrfit3, c("cfi", "rmsea", "srmr")),
  Scalar = fitMeasures(survey.scalfit3, c("cfi", "rmsea", "srmr")),
  Strict = fitMeasures(survey.varianfit3,  c("cfi", "rmsea", "srmr"))),3))
  dif <- invar %>%
      mutate_all(funs(. - lag(.)))
  print(paste("ESS round: ", r))
  print(cbind(invar,dif))

}
```

```
## [1] "ESS round:  8"
##              cfi rmsea  srmr    cfi  rmsea  srmr
## Configural 0.982 0.062 0.018     NA     NA    NA
## Metric     0.974 0.057 0.029 -0.008 -0.005 0.011
## Scalar     0.886 0.100 0.059 -0.088  0.043 0.030
## Strict     0.852 0.105 0.106 -0.034  0.005 0.047
```

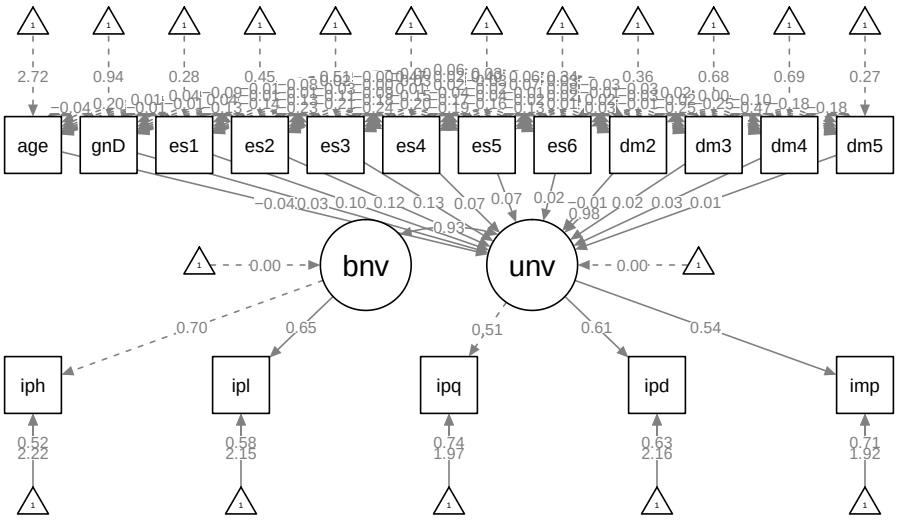
```
## [1] "ESS round:  9"
##              cfi rmsea  srmr    cfi  rmsea  srmr
## Configural 0.979 0.066 0.018     NA     NA    NA
## Metric     0.968 0.063 0.032 -0.011 -0.003 0.014
## Scalar     0.870 0.107 0.063 -0.098  0.044 0.031
## Strict     0.838 0.109 0.103 -0.032  0.002 0.040
```

```
semmodel <-'
benev =~ iphlppl + iplylfr
unive =~ ipeqopt + ipudrst + impenv
unive ~~  benev
unive ~  agea + gndrD + eisced1 + eisced2 + eisced3 + eisced4 + eisced5 + eisced6 + domicil2 + domicil3
'

for (r in c(8,9)) {
  ds_filtrada2 <- ds_filtradaAll %>% filter(essround == r)
  survey.design2 <- svydesign(ids=~idno, prob=~dweight, data=ds_filtrada2)

  lavaan.semfit <- lavaan(semmodel, data=ds_filtrada2,
                          auto.fix.first=TRUE,  #factor loading of first indicator set to 1
                          int.ov.free=TRUE,     #intercepts not fixed to 0
                          meanstructure=TRUE,   #the means of the observed variables enter the model, n
                          auto.var=TRUE,        #residual variances and variances of exogeneous latent
                          auto.cov.lv.x=TRUE,   #covariances of exogeneous latent variables are include
                          estimator="MLM",
                          cluster = "cntry")
  survey.semfit <- lavaan.survey(lavaan.fit=lavaan.semfit,survey.design=survey.design2)
  assign(paste0("survey.semfit",r),survey.semfit)

  print(paste("ESS round: ", r))
  print(modindices(survey.semfit,sort=T)[1:10,])
  invisible(semPaths(survey.semfit,"model","stand", style = "lisrel"))
  print(fitMeasures(survey.semfit, c("cfi", "rmsea", "srmr")))

}
```

```
## [1] "ESS round:  8"
##          lhs op     rhs      mi    epc sepc.lv sepc.all sepc.nox
## 150    gndrD  ~   unive 416.472  0.144   0.084    0.168    0.168
## 137  ipudrst ~~  impenv 189.051 -0.091  -0.091   -0.128   -0.128
## 134  iplylfr ~~  impenv 155.082  0.063   0.063    0.107    0.107
## 135  ipeqopt ~~ ipudrst 139.669  0.082   0.082    0.112    0.112
## 174  eisced2  ~   unive  98.159  0.038   0.022    0.058    0.058
## 198  eisced4  ~   unive  65.146  0.031   0.018    0.047    0.047
## 132  iplylfr ~~ ipeqopt  58.974 -0.041  -0.041   -0.066   -0.066
## 246 domicil3  ~   unive  56.369 -0.035  -0.021   -0.044   -0.044
## 270 domicil5  ~   unive  49.053 -0.022  -0.013   -0.050   -0.050
## 162  eisced1  ~   unive  47.852  0.022   0.012    0.045    0.045
```




```
##   cfi rmsea  srmr
## 0.917 0.040 0.022
## [1] "ESS round:  9"
##          lhs op     rhs      mi    epc sepc.lv sepc.all sepc.nox
## 150    gndrD  ~   unive 347.062  0.139   0.075    0.149    0.149
## 134  iplylfr ~~  impenv 332.989  0.091   0.091    0.164    0.164
## 135  ipeqopt ~~ ipudrst 153.093  0.083   0.083    0.112    0.112
## 137  ipudrst ~~  impenv 122.154 -0.072  -0.072   -0.107   -0.107
## 132  iplylfr ~~ ipeqopt  81.584 -0.047  -0.047   -0.078   -0.078
## 133  iplylfr ~~ ipudrst  80.607 -0.050  -0.050   -0.092   -0.092
## 124    benev =~ ipudrst  63.752 -0.504  -0.339   -0.330   -0.330
## 131  iphlppl ~~  impenv  58.012 -0.043  -0.043   -0.074   -0.074
## 234 domicil2  ~   unive  53.170 -0.029  -0.015   -0.049   -0.049
## 130  iphlppl ~~ ipudrst  36.489  0.038   0.038    0.067    0.067
```




```
##   cfi rmsea  srmr
## 0.918 0.039 0.021
```

```
countries <- c("Austria","Belgium","Czechia","Estonia","France","Germany","Ireland","Italy","Netherlands
```

```
for (r in c(8,9)) {
  ds_filtrada2 <- ds_filtradaAll %>% filter(essround == r)
  survey.design2 <- svydesign(ids=~idno, prob=~dweight, data=ds_filtrada2)

  # 1. CONFIGURAL EQUIVALENCE
  ## Add the "meanstructure" argument to add means/intercepts
  lavaan.semconffit3 <- lavaan(semmodel, data=ds_filtrada2,
                               auto.fix.first=TRUE,  #factor loading of first indicator set to 1
                               int.ov.free=TRUE,     #intercepts not fixed to 0
                               meanstructure=TRUE,   #the means of the observed variables enter the model,
                               auto.var=TRUE,        #residual variances and variances of exogeneous laten
                               auto.cov.lv.x=TRUE,   #covariances of exogeneous latent variables are inclu
                               estimator="MLM",
                               group = "cntry",
                               group.label = countries
                               #group.equal = ...    #vector for multigroup analysis specify the pattern o
                               )
  survey.semconffit3 <- lavaan.survey(lavaan.fit=lavaan.semconffit3,survey.design=survey.design2)
  assign(paste0("survey.semconffit3r",r),survey.semconffit3)
```

```
  # 2. METRIC EQUIVALENCE: set the factor loadings equal across groups

  lavaan.semmetrfit3 <- lavaan(semmodel, data=ds_filtrada2,
                           auto.fix.first=TRUE,  #factor loading of first indicator set to 1
                           int.ov.free=TRUE,     #intercepts not fixed to 0
                           meanstructure=TRUE,   #the means of the observed variables enter the model, n
                           auto.var=TRUE,        #residual variances and variances of exogeneous latent
                           auto.cov.lv.x=TRUE,   #covariances of exogeneous latent variables are include
                           estimator="MLM",
                           group = "cntry",
                           group.label = countries,
                           group.equal=c("loadings") #vector for multigroup analysis specify the pattern
                           )
  survey.semmetrfit3 <- lavaan.survey(lavaan.fit=lavaan.semmetrfit3,survey.design=survey.design2)

  # 3. SCALAR EQUIVALENCE: set the factor loadings and the intercepts equal across groups

  lavaan.semscalfit3 <- lavaan(semmodel, data=ds_filtrada2,
                           auto.fix.first=TRUE,  #factor loading of first indicator set to 1
                           int.ov.free=TRUE,     #intercepts not fixed to 0
                           meanstructure=TRUE,   #the means of the observed variables enter the model, n
                           auto.var=TRUE,        #residual variances and variances of exogeneous latent
                           auto.cov.lv.x=TRUE,   #covariances of exogeneous latent variables are include
                           estimator="MLM",
                           group = "cntry",
                           group.label = countries,
                           group.equal=c("loadings","intercepts"))
  survey.semscalfit3 <- lavaan.survey(lavaan.fit=lavaan.semscalfit3,survey.design=survey.design2)


  # 4. check whether factor variances are equal across groups
  lavaan.semvarianfit3 <- lavaan(semmodel, data=ds_filtrada2,
                           auto.fix.first=TRUE,  #factor loading of first indicator set to 1
                           int.ov.free=TRUE,     #intercepts not fixed to 0
                           meanstructure=TRUE,   #the means of the observed variables enter the model, n
                           auto.var=TRUE,        #residual variances and variances of exogeneous latent
                           auto.cov.lv.x=TRUE,   #covariances of exogeneous latent variables are include
                           estimator="MLM",
                           group = "cntry",
                           group.label = countries,
                           group.equal=c("loadings","intercepts","lv.variances"))
  survey.semvarianfit3 <- lavaan.survey(lavaan.fit=lavaan.semvarianfit3,survey.design=survey.design2)

  seminvar <- data.frame(round(rbind(Configural = fitMeasures(survey.semconffit3, c("cfi", "rmsea", "sr
                                Metric = fitMeasures(survey.semmetrfit3, c("cfi", "rmsea", "srmr")),
                                Scalar = fitMeasures(survey.semscalfit3, c("cfi", "rmsea", "srmr")),
                                Strict = fitMeasures(survey.semvarianfit3,  c("cfi", "rmsea", "srmr"))
  semdif <- seminvar %>%
      mutate_all(funs(. - lag(.)))
  print(paste("ESS round: ", r))
  print(cbind(seminvar,semdif))

}
```

```
## [1] "ESS round:  8"
##              cfi rmsea  srmr    cfi rmsea  srmr
## Configural 0.879 0.048 0.029     NA    NA    NA
## Metric     0.873 0.048 0.030 -0.006 0.000 0.001
## Scalar     0.797 0.059 0.035 -0.076 0.011 0.005
## Strict     0.768 0.062 0.046 -0.029 0.003 0.011
## [1] "ESS round:  9"
##              cfi rmsea  srmr    cfi rmsea  srmr
## Configural 0.891 0.044 0.027     NA    NA    NA
## Metric     0.882 0.045 0.029 -0.009 0.001 0.002
## Scalar     0.794 0.058 0.034 -0.088 0.013 0.005
## Strict     0.765 0.061 0.044 -0.029 0.003 0.010
```

```
sum1 <-full_join(parameterEstimates(survey.fit3r8),
                 parameterEstimates(survey.fit3r9),
                 by=c("lhs", "op", "rhs"))
sum2 <-full_join(parameterEstimates(survey.conffit3r8),
                 parameterEstimates(survey.conffit3r9),
                 by=c("lhs", "op", "rhs", "block", "group"))

sum3 <-full_join(parameterEstimates(survey.semfit8),
                 parameterEstimates(survey.semfit9),
                 by=c("lhs", "op", "rhs"))
sum4 <-full_join(parameterEstimates(survey.semconffit3r8),
                 parameterEstimates(survey.semconffit3r9),
                 by=c("lhs", "op", "rhs", "block", "group"))

dir <- "G:/My Drive/Master in Statistics/Structural equations/Paper/"
write.table(sum1,paste0(dir,"Parametersfit.csv"), sep = ",", row.names = FALSE)
write.table(sum2,paste0(dir,"ParametersConffit.csv"), sep = ",", row.names = FALSE)

write.table(sum3,paste0(dir,"ParametersSemfit.csv"), sep = ",", row.names = FALSE)
write.table(sum4,paste0(dir,"ParametersSemConffit.csv"), sep = ",", row.names = FALSE)
```