Many missing correlations

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https://openmx.ssri.psu.edu/node/4583

```
library(metaSEM)
```

```
## Loading required package: OpenMx
```

```
## To take full advantage of multiple cores, use:
##   mxOption(key='Number of Threads', value=parallel::detectCores()) #now
##   Sys.setenv(OMP_NUM_THREADS=parallel::detectCores()) #before library(OpenMx)
```

```
## "SLSQP" is set as the default optimizer in OpenMx.
```

```
## mxOption(NULL, "Gradient algorithm") is set at "central".
```

```
## mxOption(NULL, "Optimality tolerance") is set at "6.3e-14".
```

```
## mxOption(NULL, "Gradient iterations") is set at "2".
```

```
data <- read.table(file = "metaSEM4_0.dat", header = TRUE)
head(data)
```

```
##   Study   N v1_v2 v1_v3 v1_v4 v1_v5 v1_v6 v2_v3 v2_v4 v2_v5 v2_v6 v3_v4 v3_v5
## 1     1 174    NA    NA    NA    NA    NA    NA    NA    NA    NA    NA  0.24
## 2     2 445    NA    NA    NA    NA    NA    NA  0.58    NA    NA    NA    NA
## 3     3  32    NA    NA    NA    NA    NA    NA    NA    NA    NA    NA    NA
## 4     4  33    NA    NA    NA    NA    NA    NA    NA    NA    NA    NA    NA
## 5     5  39    NA    NA    NA    NA    NA    NA    NA    NA    NA    NA  0.73
## 6     6  39    NA    NA    NA    NA    NA    NA    NA    NA    NA    NA  0.59
##   v3_v6 v4_v5 v4_v6 v5_v6
## 1    NA    NA    NA    NA
## 2    NA  0.40    NA    NA
## 3    NA  0.50    NA    NA
## 4    NA  0.04    NA    NA
## 5    NA    NA    NA    NA
## 6    NA    NA    NA    NA
```

```
nvar <- 6
varnames <- c("v1 ","v2","v3","v4","v5","v6")
labels <- list(varnames,varnames)
cordat <- list()
for (i in 1:nrow(data)){
     cordat[[i]] <- vec2symMat(as.matrix(data[i,3:17]),
     diag = FALSE)
     dimnames(cordat[[i]]) <- labels
}
```

```
for (i in 1:length(cordat)){
  for (j in 1:nrow(cordat[[i]])){
      if (sum(is.na(cordat[[i]][j,]))==nvar-1)
     {cordat[[i]][j,j] <- NA}
}}

cordat[[13]]
```

```
##     v1  v2  v3 v4  v5 v6
## v1   NA NA  NA NA  NA NA
## v2   NA NA  NA NA  NA NA
## v3   NA NA 1.0 NA 0.4 NA
## v4   NA NA  NA NA  NA NA
## v5   NA NA 0.4 NA 1.0 NA
## v6   NA NA  NA NA  NA NA
```

```
for (i in 1:length(cordat)){
for (j in 1:nrow(cordat[[i]])){
  for (k in 1:nvar){
     if (is.na(cordat[[i]][j,k])==TRUE
        &is.na(cordat[[i]][j,j])!=TRUE
        &is.na(cordat[[i]][k,k])!=TRUE){
 if(sum(is.na(cordat[[i]])[j,])>sum(is.na(cordat[[i]])[k,]))
   {cordat[[i]][k,k] <- NA}
if(sum(is.na(cordat[[i]])[j,])<=sum(is.na(cordat[[i]])[k,]))
   {cordat[[i]][j,j] <- NA}
}}}}

# stage1fixed  <- tssem1(Cov=cordat, n=data$N, method="REM", RE.type="Zero")
# summary(stage1fixed)

stage1random <- tssem1(Cov=cordat, n=data$N, method="REM")
stage1random <- rerun(stage1random, autofixtau2 = TRUE)
```

```
## Running TSSEM1 Correlation with 30 parameters
##
## Beginning initial fit attempt
## Running TSSEM1 Correlation with 30 parameters
##
##  Lowest minimum so far:  -341.750622295448
##  Not all eigenvalues of the Hessian are positive: 401135.607944602, 147491.847684654, 76762.11504876
##
## Beginning fit attempt 1 of at maximum 10 extra tries
## Running TSSEM1 Correlation with 30 parameters
##  Not all eigenvalues of the Hessian are positive: 401135.608918055, 147491.849048463, 76762.11685192
##
## Beginning fit attempt 2 of at maximum 10 extra tries
## Running TSSEM1 Correlation with 30 parameters
##
```

```
##  Lowest minimum so far:  -341.750622296416
##  Not all eigenvalues of the Hessian are positive: 401135.836153742, 147491.754562791, 76762.29615357
##
## Beginning fit attempt 3 of at maximum 10 extra tries
## Running TSSEM1 Correlation with 30 parameters
##
##  Lowest minimum so far:  -341.750622296958
##  Not all eigenvalues of the Hessian are positive: 401135.80845603, 147492.325551991, 76762.229089849
##
## Beginning fit attempt 4 of at maximum 10 extra tries
## Running TSSEM1 Correlation with 30 parameters
##  Not all eigenvalues of the Hessian are positive: 401135.806585092, 147492.322151334, 76762.22625201
##
## Beginning fit attempt 5 of at maximum 10 extra tries
## Running TSSEM1 Correlation with 30 parameters
##  Not all eigenvalues of the Hessian are positive: 401135.490994888, 147475.919946766, 76762.63351326
##
## Beginning fit attempt 6 of at maximum 10 extra tries
## Running TSSEM1 Correlation with 30 parameters
##  Not all eigenvalues of the Hessian are positive: 401135.790675054, 147491.763703245, 76762.02238162
##
## Beginning fit attempt 7 of at maximum 10 extra tries
## Running TSSEM1 Correlation with 30 parameters
##
##  Lowest minimum so far:  -341.750622297403
##  Not all eigenvalues of the Hessian are positive: 401135.828641763, 147491.952194547, 76762.18997703
##
## Beginning fit attempt 8 of at maximum 10 extra tries
## Running TSSEM1 Correlation with 30 parameters
##  Not all eigenvalues of the Hessian are positive: 401135.830588388, 147491.954158329, 76762.19174933
##
## Beginning fit attempt 9 of at maximum 10 extra tries
## Running TSSEM1 Correlation with 30 parameters
##  Not all eigenvalues of the Hessian are positive: 401135.887447516, 147492.203907797, 76762.33697663
##
## Beginning fit attempt 10 of at maximum 10 extra tries
## Running TSSEM1 Correlation with 30 parameters
##  Not all eigenvalues of the Hessian are positive: 401135.783411033, 147491.621011274, 76762.31152382
##
## Retry limit reached
```

```
##
##  Retry limit reached; Best fit=-341.75062 (started at -341.75062)  (11 attempt(s): 11 valid, 0 errors
## Running TSSEM1 Correlation with 29 parameters
##
## Beginning initial fit attempt
## Running TSSEM1 Correlation with 29 parameters
##
## Solution found
##
##  Solution found!  Final fit=-341.75062 (started at -341.75062)  (1 attempt(s): 1 valid, 0 errors)
summary(stage1random)

##
## Call:
## meta(y = ES, v = acovR, RE.constraints = Diag(paste0(RE.startvalues,
##     "*Tau2_", 1:no.es, "_", 1:no.es)), RE.lbound = RE.lbound,
##     I2 = I2, model.name = model.name, suppressWarnings = TRUE,
##     silent = silent, run = run)
##
## 95% confidence intervals: z statistic approximation (robust=FALSE)
## Coefficients:
##                Estimate   Std.Error      lbound      ubound z value  Pr(>|z|)
## Intercept1   3.5674e-02  3.8227e-02 -3.9248e-02  1.1060e-01  0.9332  0.350700
## Intercept2   1.0534e-01  1.6971e-01 -2.2728e-01  4.3796e-01  0.6207  0.534775
## Intercept3   4.9244e-01  5.1627e-02  3.9126e-01  5.9363e-01  9.5385 < 2.2e-16
## Intercept4   7.9443e-02  5.8848e-02 -3.5897e-02  1.9478e-01  1.3500  0.177028
## Intercept5   1.4851e-01  1.0990e-01 -6.6900e-02  3.6391e-01  1.3512  0.176618
## Intercept6   1.3393e-01  2.4096e-02  8.6707e-02  1.8116e-01  5.5583 2.724e-08
## Intercept7   2.2790e-01  3.4890e-02  1.5952e-01  2.9629e-01  6.5320 6.491e-11
## Intercept8   2.1995e-01  1.0410e-02  1.9954e-01  2.4035e-01 21.1278 < 2.2e-16
## Intercept9   2.8060e-01  3.7708e-02  2.0669e-01  3.5450e-01  7.4412 9.970e-14
## Intercept10  1.6877e-01  9.4175e-02 -1.5814e-02  3.5334e-01  1.7920  0.073127
## Intercept11  3.1030e-01  2.5045e-02  2.6122e-01  3.5939e-01 12.3899 < 2.2e-16
## Intercept12  1.2881e-01  1.2664e-01 -1.1941e-01  3.7702e-01  1.0171  0.309117
## Intercept13  2.6362e-01  2.4469e-02  2.1567e-01  3.1158e-01 10.7739 < 2.2e-16
## Intercept14 -5.7899e-02  5.7696e-02 -1.7098e-01  5.5184e-02 -1.0035  0.315614
## Intercept15  3.5509e-01  3.3831e-02  2.8878e-01  4.2139e-01 10.4959 < 2.2e-16
## Tau2_2_2     5.1881e-02  5.7494e-02 -6.0805e-02  1.6457e-01  0.9024  0.366860
## Tau2_3_3     1.0072e-10  5.7266e-03 -1.1224e-02  1.1224e-02  0.0000  1.000000
## Tau2_4_4     3.5346e-02  1.8504e-02 -9.2209e-04  7.1614e-02  1.9101  0.056116
## Tau2_5_5     7.2718e-02  4.6164e-02 -1.7762e-02  1.6320e-01  1.5752  0.115208
## Tau2_6_6     8.1903e-03  3.7012e-03  9.3599e-04  1.5445e-02  2.2128  0.026908
## Tau2_7_7     1.9862e-02  9.1421e-03  1.9440e-03  3.7780e-02  2.1726  0.029810
## Tau2_8_8     1.7525e-02  2.2351e-03  1.3144e-02  2.1906e-02  7.8408 4.441e-15
## Tau2_9_9     1.2313e-02  7.2248e-03 -1.8471e-03  2.6474e-02  1.7043  0.088325
## Tau2_10_10   3.0139e-02  2.6186e-02 -2.1185e-02  8.1463e-02  1.1509  0.249754
## Tau2_11_11   2.6842e-02  6.8011e-03  1.3512e-02  4.0172e-02  3.9466 7.926e-05
## Tau2_12_12   8.4210e-02  5.6044e-02 -2.5635e-02  1.9405e-01  1.5026  0.132954
## Tau2_13_13   1.5596e-02  5.1774e-03  5.4482e-03  2.5743e-02  3.0123  0.002593
## Tau2_14_14   4.3752e-02  2.0684e-02  3.2112e-03  8.4293e-02  2.1152  0.034412
## Tau2_15_15   9.6711e-03  5.6447e-03 -1.3923e-03  2.0735e-02  1.7133  0.086657
```

```
##
## Intercept1
## Intercept2
## Intercept3  ***
## Intercept4
## Intercept5
## Intercept6  ***
## Intercept7  ***
## Intercept8  ***
## Intercept9  ***
## Intercept10 .
## Intercept11 ***
## Intercept12
## Intercept13 ***
## Intercept14
## Intercept15 ***
## Tau2_2_2
## Tau2_3_3
## Tau2_4_4    .
## Tau2_5_5
## Tau2_6_6    *
## Tau2_7_7    *
## Tau2_8_8    ***
## Tau2_9_9    .
## Tau2_10_10
## Tau2_11_11  ***
## Tau2_12_12
## Tau2_13_13  **
## Tau2_14_14  *
## Tau2_15_15  .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Q statistic on the homogeneity of effect sizes: 2673.115
## Degrees of freedom of the Q statistic: 423
## P value of the Q statistic: 0
##
## Heterogeneity indices (based on the estimated Tau2):
##                                Estimate
## Intercept1: I2 (Q statistic)    0.0000
## Intercept2: I2 (Q statistic)    0.9474
## Intercept3: I2 (Q statistic)    0.0000
## Intercept4: I2 (Q statistic)    0.9246
## Intercept5: I2 (Q statistic)    0.9619
## Intercept6: I2 (Q statistic)    0.7398
## Intercept7: I2 (Q statistic)    0.8733
## Intercept8: I2 (Q statistic)    0.8643
## Intercept9: I2 (Q statistic)    0.8104
## Intercept10: I2 (Q statistic)   0.9127
## Intercept11: I2 (Q statistic)   0.9032
## Intercept12: I2 (Q statistic)   0.9669
## Intercept13: I2 (Q statistic)   0.8441
## Intercept14: I2 (Q statistic)   0.9382
## Intercept15: I2 (Q statistic)   0.7705
```

```
##
## Number of studies (or clusters): 379
## Number of observed statistics: 438
## Number of estimated parameters: 29
## Degrees of freedom: 409
## -2 log likelihood: -341.7506
## OpenMx status1: 0 ("0" or "1": The optimization is considered fine.
## Other values may indicate problems.)
```

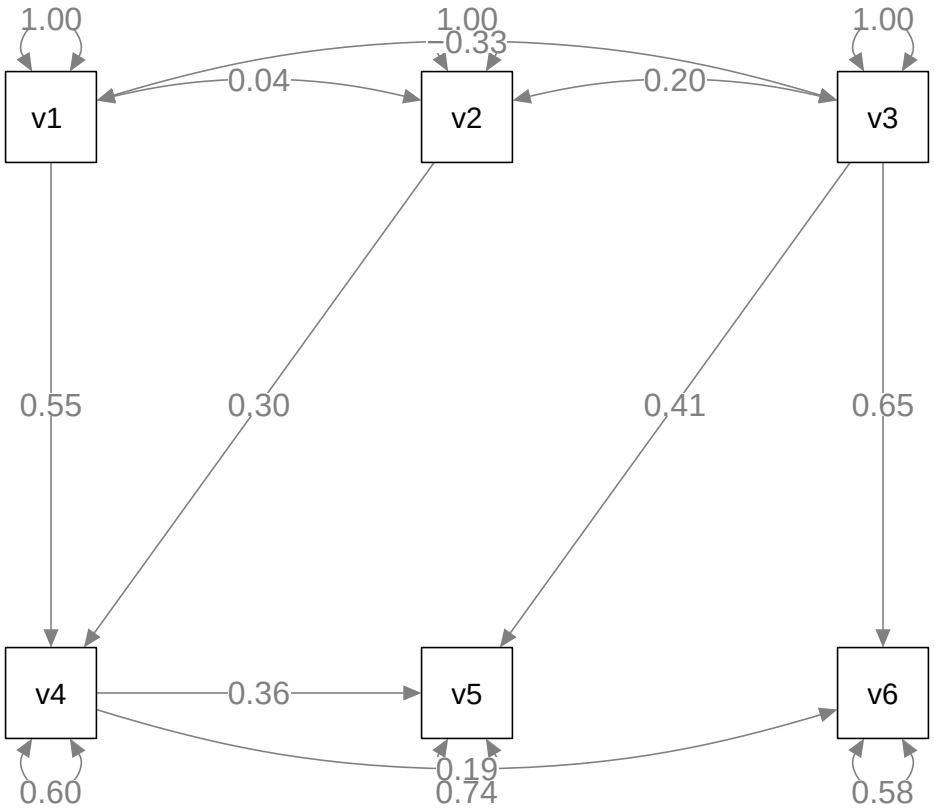
```
A<-create.mxMatrix (c(0,0,0,0,0,0
,0,0,0,0,0,0,
0,0,0,0,0,0,
"0.1*b41","0.1*b42",0,0,0,0,
0,0,"0.1*b53","0.1*b54",0,0,
0,0,"0.1*b63","0.1*b64",0,0),
type = "Full",
      nrow = 6,
      ncol = 6,
      byrow = TRUE,
      name = "A",
      dimnames = list(varnames,varnames))

S <- create.mxMatrix(
c(1,
".1*p21",1,
".1*p31",".1*p32",1,
0,0,0,"1*p44",
0,0,0,0,"1*p55",
0,0,0,0,0,"1*p66"),
type="Symm", byrow = TRUE, name="S",
      dimnames = list(varnames,varnames))

stage2 <- tssem2(stage1random, Amatrix=A, Smatrix=S,
                 diag.constraints=FALSE, intervals="LB")
summary(stage2)
```

```
##
## Call:
## wls(Cov = pooledS, aCov = aCov, n = tssem1.obj$total.n, RAM = RAM,
##     Amatrix = Amatrix, Smatrix = Smatrix, Fmatrix = Fmatrix,
##     diag.constraints = diag.constraints, cor.analysis = cor.analysis,
##     intervals.type = intervals.type, mx.algebras = mx.algebras,
##     model.name = model.name, suppressWarnings = suppressWarnings,
##     silent = silent, run = run)
##
## 95% confidence intervals: Likelihood-based statistic
## Coefficients:
##      Estimate Std.Error    lbound    ubound z value Pr(>|z|)
## b41  0.545374        NA  0.443233  0.643550      NA       NA
## b42  0.301758        NA  0.229143  0.373562      NA       NA
## b53  0.406600        NA  0.352499  0.465238      NA       NA
## b54  0.364211        NA  0.306955  0.426759      NA       NA
## b63  0.645278        NA  0.505137  0.790270      NA       NA
## b64  0.193998        NA  0.068458  0.311900      NA       NA
## p21  0.036556        NA -0.039310  0.112407      NA       NA
```

```
## p31 -0.331146        NA -0.491288 -0.153820      NA       NA
## p32  0.197413        NA  0.152893  0.241686      NA       NA
##
## Goodness-of-fit indices:
##                                                 Value
## Sample size                                1.3240e+05
## Chi-square of target model                 8.3600e+01
## DF of target model                         6.0000e+00
## p value of target model                    0.0000e+00
## Number of constraints imposed on "Smatrix" 0.0000e+00
## DF manually adjusted                       0.0000e+00
## Chi-square of independence model           1.0520e+03
## DF of independence model                   1.5000e+01
## RMSEA                                      9.9000e-03
## RMSEA lower 95% CI                         8.1000e-03
## RMSEA upper 95% CI                         1.1800e-02
## SRMR                                       2.0770e-01
## TLI                                        8.1290e-01
## CFI                                        9.2520e-01
## AIC                                        7.1600e+01
## BIC                                        1.2839e+01
## OpenMx status1: 0 ("0" or "1": The optimization is considered fine.
## Other values indicate problems.)
```

```
plot(stage2)
```

```
## Registered S3 methods overwritten by 'huge':
##   method    from
##   plot.sim  BDgraph
##   print.sim BDgraph
```




```
sessionInfo()
```

```
## R version 3.6.2 (2019-12-12)
## Platform: x86_64-pc-linux-gnu (64-bit)
## Running under: Linux Mint 19.1
##
## Matrix products: default
## BLAS:   /usr/lib/x86_64-linux-gnu/openblas/libblas.so.3
## LAPACK: /usr/lib/x86_64-linux-gnu/libopenblasp-r0.2.20.so
##
## locale:
##  [1] LC_CTYPE=en_SG.UTF-8       LC_NUMERIC=C
##  [3] LC_TIME=en_SG.UTF-8        LC_COLLATE=en_SG.UTF-8
##  [5] LC_MONETARY=en_SG.UTF-8    LC_MESSAGES=en_SG.UTF-8
##  [7] LC_PAPER=en_SG.UTF-8       LC_NAME=C
##  [9] LC_ADDRESS=C               LC_TELEPHONE=C
## [11] LC_MEASUREMENT=en_SG.UTF-8 LC_IDENTIFICATION=C
##
## attached base packages:
## [1] stats     graphics  grDevices utils     datasets  methods   base
##
## other attached packages:
## [1] metaSEM_1.2.3.1 OpenMx_2.15.5
##
## loaded via a namespace (and not attached):
##   [1] nlme_3.1-143        RColorBrewer_1.1-2  mi_1.0
```

```
##   [4] tools_3.6.2         backports_1.1.5     R6_2.4.1
##   [7] d3Network_0.5.2.1   rpart_4.1-15        Hmisc_4.3-0
##  [10] lazyeval_0.2.2      colorspace_1.4-1    nnet_7.3-12
##  [13] tidyselect_0.2.5    gridExtra_2.3       mnormt_1.5-5
##  [16] compiler_3.6.2      qgraph_1.6.4        fdrtool_1.2.15
##  [19] htmlTable_1.13.3    regsem_1.3.9        scales_1.1.0
##  [22] checkmate_1.9.4     mvtnorm_1.0-12      psych_1.9.12.31
##  [25] pbapply_1.4-2       sem_3.1-9           stringr_1.4.0
##  [28] digest_0.6.23       pbivnorm_0.6.0      foreign_0.8-75
##  [31] minqa_1.2.4         rmarkdown_2.1       base64enc_0.1-3
##  [34] jpeg_0.1-8          pkgconfig_2.0.3     htmltools_0.4.0
##  [37] lme4_1.1-21         lisrelToR_0.1.4     htmlwidgets_1.5.1
##  [40] rlang_0.4.2         huge_1.3.4          rstudioapi_0.10
##  [43] gtools_3.8.1        acepack_1.4.1       dplyr_0.8.3
##  [46] zip_2.0.4           magrittr_1.5        Formula_1.2-3
##  [49] Matrix_1.2-18       Rcpp_1.0.3          munsell_0.5.0
##  [52] abind_1.4-5         rockchalk_1.8.144   lifecycle_0.1.0
##  [55] whisker_0.4         stringi_1.4.5       yaml_2.2.0
##  [58] carData_3.0-3       MASS_7.3-51.5       plyr_1.8.5
##  [61] matrixcalc_1.0-3    lavaan_0.6-5        grid_3.6.2
##  [64] parallel_3.6.2      crayon_1.3.4        lattice_0.20-38
##  [67] semPlot_1.1.3       kutils_1.69         splines_3.6.2
##  [70] knitr_1.27          pillar_1.4.3        igraph_1.2.4.2
##  [73] rjson_0.2.20        boot_1.3-24         corpcor_1.6.9
##  [76] BDgraph_2.62        reshape2_1.4.3      stats4_3.6.2
##  [79] XML_3.98-1.20       glue_1.3.1          evaluate_0.14
##  [82] latticeExtra_0.6-29 data.table_1.12.8   png_0.1-7
##  [85] nloptr_1.2.1        gtable_0.3.0        purrr_0.3.3
##  [88] assertthat_0.2.1    ggplot2_3.2.1       xfun_0.12
##  [91] openxlsx_4.1.4      xtable_1.8-4        coda_0.19-3
##  [94] Rsolnp_1.16         glasso_1.11         survival_3.1-8
##  [97] truncnorm_1.0-8     tibble_2.1.3        arm_1.10-1
## [100] ggm_2.3             ellipse_0.4.1       cluster_2.1.0
```