Fitting a mediation model with covariates

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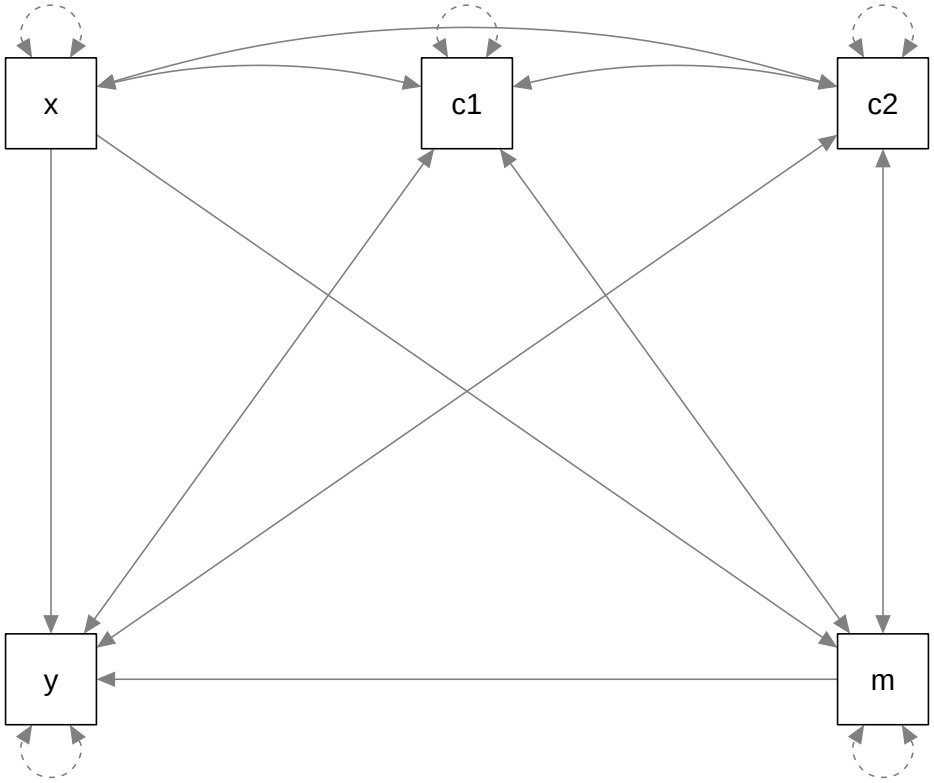
```
library(metaSEM)

model <- "## Mediation model
          y ~ x + m
          m ~ x
          ## Fix the variances of independent variables at 1
          x ~~ 1*x
          c1 ~~ 1*c1
          c2 ~~ 1*c2
          ## C1 and C2 are correlated with the residuals of y and m
          y + m ~~ c1 + c2
          ## c1 and c2 are correlated with x
          c1 + c2 ~~ x
          c1 ~~ c2"
plot(model)
```




```
obs.var <- c("y", "m", "x", "c1", "c2")

RAM <- lavaan2RAM(model, obs.variables = obs.var)
RAM
```

```
## $A
##    y   m        x        c1  c2
```

```
## y  "0" "0*yONm" "0*yONx" "0" "0"
## m  "0" "0"      "0*mONx" "0" "0"
## x  "0" "0"      "0"      "0" "0"
## c1 "0" "0"      "0"      "0" "0"
## c2 "0" "0"      "0"      "0" "0"
##
## $S
##    y           m           x           c1           c2
## y  "0*yWITHy"  "0"         "0"         "0*yWITHc1"  "0*yWITHc2"
## m  "0"         "0*mWITHm"  "0"         "0*mWITHc1"  "0*mWITHc2"
## x  "0"         "0"         "1"         "0*xWITHc1"  "0*xWITHc2"
## c1 "0*yWITHc1" "0*mWITHc1" "0*xWITHc1" "1"          "0*c1WITHc2"
## c2 "0*yWITHc2" "0*mWITHc2" "0*xWITHc2" "0*c1WITHc2" "1"
##
## $F
##    y m x c1 c2
## y  1 0 0  0  0
## m  0 1 0  0  0
## x  0 0 1  0  0
## c1 0 0 0  1  0
## c2 0 0 0  0  1
##
## $M
##   y m x c1 c2
## 1 0 0 0  0  0
```

```
n <- 1000

## Sample correlation matrix
R <- matrix(.3, ncol=5, nrow=5)
diag(R) <- 1
dimnames(R) <- list(obs.var, obs.var)
R
```

```
##      y   m   x  c1  c2
## y  1.0 0.3 0.3 0.3 0.3
## m  0.3 1.0 0.3 0.3 0.3
## x  0.3 0.3 1.0 0.3 0.3
## c1 0.3 0.3 0.3 1.0 0.3
## c2 0.3 0.3 0.3 0.3 1.0
```

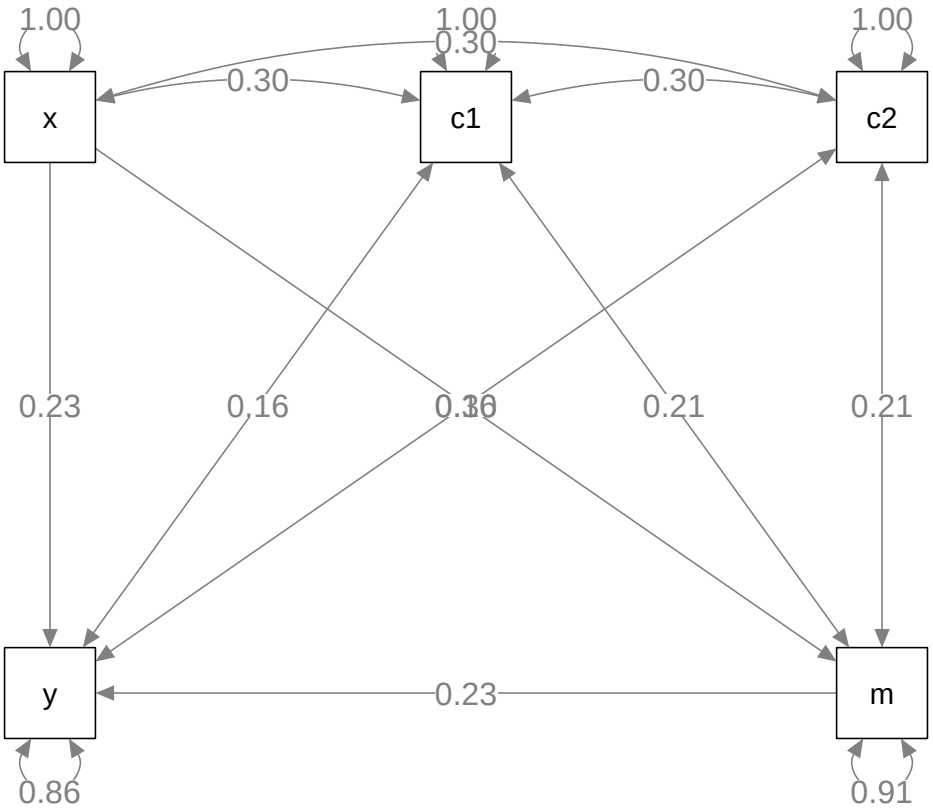
```
## Sampling covariance matrix
Acov <- asyCov(R, n)

## It is important to use diag.constraints = TRUE
fit <- wls(Cov=R, aCov=Acov, n=n, RAM=RAM, diag.constraints = TRUE)
summary(fit)
```

```
## Warning in vcov.wls(object, R = R): Parametric bootstrap with 50 replications was used to approximat
```

```
##
## Call:
## wls(Cov = R, aCov = Acov, n = n, RAM = RAM, diag.constraints = TRUE)
##
## 95% confidence intervals: z statistic approximation
## Coefficients:
```

```
##          Estimate Std.Error   lbound   ubound z value  Pr(>|z|)
## mONx     0.300000  0.032536 0.236231 0.363769  9.2206 < 2.2e-16 ***
## yONm     0.230769  0.033211 0.165677 0.295861  6.9486 3.689e-12 ***
## yONx     0.230769  0.031954 0.168141 0.293398  7.2220 5.125e-13 ***
## mWITHc1  0.210000  0.024924 0.161149 0.258851  8.4255 < 2.2e-16 ***
## xWITHc1  0.300000  0.027187 0.246715 0.353285 11.0348 < 2.2e-16 ***
## yWITHc1  0.161538  0.028676 0.105335 0.217742  5.6333 1.768e-08 ***
## c1WITHc2 0.300000  0.021852 0.257170 0.342830 13.7285 < 2.2e-16 ***
## mWITHc2  0.210000  0.028358 0.154418 0.265582  7.4052 1.310e-13 ***
## xWITHc2  0.300000  0.019894 0.261009 0.338991 15.0803 < 2.2e-16 ***
## yWITHc2  0.161538  0.026174 0.110239 0.212838  6.1718 6.753e-10 ***
## mWITHm   0.910000  0.031670 0.847929 0.972071 28.7341 < 2.2e-16 ***
## yWITHy   0.861538  0.027482 0.807674 0.915403 31.3487 < 2.2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Goodness-of-fit indices:
##                                                Value
## Sample size                                 1000.00
## Chi-square of target model                     0.00
## DF of target model                             0.00
## p value of target model                        0.00
## Number of constraints imposed on "Smatrix"     2.00
## DF manually adjusted                           0.00
## Chi-square of independence model             379.49
## DF of independence model                      10.00
## RMSEA                                          0.00
## RMSEA lower 95% CI                             0.00
## RMSEA upper 95% CI                             0.00
## SRMR                                           0.00
## TLI                                            -Inf
## CFI                                            1.00
## AIC                                            0.00
## BIC                                            0.00
## OpenMx status1: 0 ("0" or "1": The optimization is considered fine.
## Other values indicate problems.)
```

```
plot(fit)
```


1.00
1.00
1.00
0.30
0.30
0.30
x
c1
c2
0.23
0.16
0.30
0.21
0.21
y
0.23
m
0.86
0.91