Answers to Exercises Basic CFA

```
library("lavaan")
```

Exercise 3.2

```
Health.cov <- lav_matrix_lower2full(c(
  0.77,
  0.38, 0.65,
  0.39, 0.39, 0.62,
 -0.25,-0.32,-0.27, 6.09,
  0.31, 0.29, 0.26,-0.36, 7.67,
  0.24, 0.25, 0.19,-0.18, 0.51, 1.69,
 -3.16,-3.56,-2.63, 6.09,-3.12,-4.58,204.79,
 -0.92,-0.88,-0.72, 0.88,-1.49,-1.41, 16.53, 7.24
))
rownames(Health.cov) <- colnames(Health.cov) <-
  c("Dep1","Dep2","Dep3", "SocAct", "Falls", "ChronCond",
    "PhysAct", "PersMob")
```

a)

```
Health.mod <- '
  PPsyHealth =~ Dep1 + Dep2 + Dep3 + SocAct
  PPhysHealth =~ ChronCond + PhysAct + Falls
  PersMob ~ PPsyHealth + PPhysHealth
'
Health.fit <- sem(Health.mod, sample.cov = Health.cov, sample.nobs = 6053)
summary(Health.fit, fit.measures = TRUE, standardized = TRUE)
```

```
## lavaan 0.6-5 ended normally after 62 iterations
##
##   Estimator                                         ML
##   Optimization method                           NLMINB
##   Number of free parameters                         18
##
##   Number of observations                          6053
##
## Model Test User Model:
##
##   Test statistic                               254.865
##   Degrees of freedom                                18
##   P-value (Chi-square)                           0.000
##
## Model Test Baseline Model:
##
##   Test statistic                             10290.938
##   Degrees of freedom                                28
```

```
##   P-value                                        0.000
##
## User Model versus Baseline Model:
##
##   Comparative Fit Index (CFI)                    0.977
##   Tucker-Lewis Index (TLI)                       0.964
##
## Loglikelihood and Information Criteria:
##
##   Loglikelihood user model (H0)             -95467.244
##   Loglikelihood unrestricted model (H1)     -95339.812
##
##   Akaike (AIC)                              190970.488
##   Bayesian (BIC)                            191091.238
##   Sample-size adjusted Bayesian (BIC)       191034.038
##
## Root Mean Square Error of Approximation:
##
##   RMSEA                                          0.047
##   90 Percent confidence interval - lower         0.042
##   90 Percent confidence interval - upper         0.052
##   P-value RMSEA <= 0.05                          0.856
##
## Standardized Root Mean Square Residual:
##
##   SRMR                                           0.027
##
## Parameter Estimates:
##
##   Information                                 Expected
##   Information saturated (h1) model          Structured
##   Standard errors                             Standard
##
## Latent Variables:
##                    Estimate  Std.Err  z-value  P(>|z|)   Std.lv  Std.all
##   PPsyHealth =~
##     Dep1              1.000                               0.624    0.712
##     Dep2              1.015    0.020   49.994    0.000    0.634    0.786
##     Dep3              0.972    0.020   49.608    0.000    0.607    0.771
##     SocAct           -0.771    0.056  -13.683    0.000   -0.481   -0.195
##   PPhysHealth =~
##     ChronCond         1.000                               0.610    0.469
##     PhysAct         -12.005    0.442  -27.173    0.000   -7.319   -0.511
##     Falls             1.073    0.070   15.337    0.000    0.654    0.236
##
## Regressions:
##                    Estimate  Std.Err  z-value  P(>|z|)   Std.lv  Std.all
##   PersMob ~
##     PPsyHealth        0.433    0.196    2.215    0.027    0.270    0.101
##     PPhysHealth      -4.034    0.286  -14.107    0.000   -2.459   -0.914
##
## Covariances:
##                    Estimate  Std.Err  z-value  P(>|z|)   Std.lv  Std.all
##   PPsyHealth ~~
```

```
##     PPhysHealth       0.250    0.011   22.634    0.000    0.656    0.656
##
## Variances:
##                    Estimate  Std.Err  z-value  P(>|z|)   Std.lv  Std.all
##    .Dep1              0.380    0.009   41.810    0.000    0.380    0.494
##    .Dep2              0.248    0.007   33.798    0.000    0.248    0.382
##    .Dep3              0.251    0.007   35.721    0.000    0.251    0.405
##    .SocAct            5.858    0.107   54.534    0.000    5.858    0.962
##    .ChronCond         1.318    0.028   46.833    0.000    1.318    0.780
##    .PhysAct         151.194    3.462   43.667    0.000  151.194    0.738
##    .Falls             7.241    0.134   54.019    0.000    7.241    0.944
##    .PersMob           1.990    0.239    8.318    0.000    1.990    0.275
##     PPsyHealth        0.390    0.014   28.811    0.000    1.000    1.000
##     PPhysHealth       0.372    0.024   15.334    0.000    1.000    1.000
```

a) Fit the SEM model in Figure 3.11 (see Beaujean book) to the data. Use the marker variable identification approach only. Evaluate and describe model fit. Make sure to add `fit.measures = TRUE` and `standardized = TRUE` to your call to `summary()` to obtain fit indices and standardized parameter estimates. Include both parameter estimates (e.g., significance and standardized values of loadings) as well as model fit indices (e.g., $\chi^2(df)$, RMSEA, CFI, SRMR) in your evaluation of model fit.

The χ^2 value is significant, but the sample size is very large. CFI and TLI are both $> .95$, RMSEA and SRMR are both $< .05$, all indicating good model fit.

All loadings are significant. However, social activities and falls have relatively small standardized loadings, and thus do not seem very good indicators of their respective factors.

b) The standardized regression coefficients suggest that poor physical health is a much stronger predictor of personal mobility than poor psychosocial health is.