Confirmatory Factor Analyses

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Three Factor

```
## maximum iteration exceeded

## Factor Analysis using method =  pa
## Call: psych::fa(r = dom_polycor$correlations, nfactors = NumFactors,
##     n.obs = nrow(domain_data), rotate = "Promax", scores = "Bartlett",
##     fm = "pa")
## Standardized loadings (pattern matrix) based upon correlation matrix
##                 PA2   PA3   PA1   h2   u2 com
## R_10          -0.17  0.72  0.13 0.49 0.51 1.2
## R_1000         0.23  0.21  0.34 0.50 0.50 2.5
## R_1_Mil        0.88 -0.11 -0.04 0.61 0.39 1.0
## R_1000_Past   -0.08  0.04  0.68 0.43 0.57 1.0
## R_1000_Exp_0   0.36  0.07  0.19 0.32 0.68 1.6
## R_Snack        0.15  0.43 -0.14 0.20 0.80 1.4
##
##                        PA2  PA3  PA1
## SS loadings           0.97 0.81 0.77
## Proportion Var        0.16 0.13 0.13
## Cumulative Var        0.16 0.30 0.43
## Proportion Explained  0.38 0.32 0.30
## Cumulative Proportion 0.38 0.70 1.00
##
##  With factor correlations of
##      PA2  PA3  PA1
## PA2 1.00 0.72 0.72
## PA3 0.72 1.00 0.70
## PA1 0.72 0.70 1.00
##
## Mean item complexity =  1.5
## Test of the hypothesis that 3 factors are sufficient.
```

```
##
## The degrees of freedom for the null model are  15  and the objective
function was  1.13 with Chi Square of  1405.23
## The degrees of freedom for the model are 0  and the objective function was
0
##
## The root mean square of the residuals (RMSR) is  0.01
## The df corrected root mean square of the residuals is  NA
##
## The harmonic number of observations is  1245 with the empirical chi square
1.05  with prob <  NA
## The total number of observations was  1245  with Likelihood Chi Square =
1.33  with prob <  NA
##
## Tucker Lewis Index of factoring reliability =  -Inf
## Fit based upon off diagonal values = 1
## Measures of factor score adequacy
##                                                   PA2  PA3  PA1
## Correlation of (regression) scores with factors   0.86 0.83 0.82
## Multiple R square of scores with factors          0.75 0.69 0.68
## Minimum correlation of possible factor scores     0.49 0.37 0.36
```

CFA

```
## lavaan 0.6-6 ended normally after 75 iterations
##
##   Estimator                                         ML
##   Optimization method                           NLMINB
##   Number of free parameters                         15
##
##   Number of observations                          1245
##
## Model Test User Model:
##
##   Test statistic                                19.804
##   Degrees of freedom                                 6
##   P-value (Chi-square)                           0.003
##
## Model Test Baseline Model:
##
##   Test statistic                              1409.575
##   Degrees of freedom                                15
##   P-value                                        0.000
##
## User Model versus Baseline Model:
##
##   Comparative Fit Index (CFI)                    0.990
##   Tucker-Lewis Index (TLI)                       0.975
##
## Loglikelihood and Information Criteria:
##
```

```
##   Loglikelihood user model (H0)             -19149.589
##   Loglikelihood unrestricted model (H1)     -19139.687
##
##   Akaike (AIC)                               38329.178
##   Bayesian (BIC)                             38406.081
##   Sample-size adjusted Bayesian (BIC)        38358.434
##
## Root Mean Square Error of Approximation:
##
##   RMSEA                                          0.043
##   90 Percent confidence interval - lower         0.023
##   90 Percent confidence interval - upper         0.065
##   P-value RMSEA <= 0.05                          0.672
##
## Standardized Root Mean Square Residual:
##
##   SRMR                                           0.019
##
## Parameter Estimates:
##
##   Standard errors                             Standard
##   Information                                 Expected
##   Information saturated (h1) model          Structured
##
## Latent Variables:
##                    Estimate  Std.Err  z-value  P(>|z|)
##   Factor1 =~
##     R_1_Mil           1.000
##     R_1000_Exp_0      0.850    0.056   15.240    0.000
##   Factor2 =~
##     R_Snack           1.000
##     R_10              1.415    0.133   10.641    0.000
##   FActor3 =~
##     R_1000_Past       1.000
##     R_1000            1.345    0.085   15.856    0.000
##
## Covariances:
##                    Estimate  Std.Err  z-value  P(>|z|)
##   Factor1 ~~
##     Factor2           2.697    0.296    9.118    0.000
##     FActor3           4.056    0.325   12.465    0.000
##   Factor2 ~~
##     FActor3           2.583    0.281    9.203    0.000
##
## Variances:
##                    Estimate  Std.Err  z-value  P(>|z|)
##    .R_1_Mil           6.680    0.429   15.558    0.000
##    .R_1000_Exp_0      6.848    0.366   18.696    0.000
##    .R_Snack          10.804    0.491   22.010    0.000
##    .R_10              6.037    0.522   11.556    0.000
```

```
##    .R_1000_Past       8.143    0.385   21.137    0.000
##    .R_1000            5.278    0.427   12.370    0.000
##     Factor1           5.586    0.532   10.505    0.000
##     Factor2           2.495    0.387    6.441    0.000
##     FActor3           3.759    0.404    9.313    0.000
```

Two Factor

```
## maximum iteration exceeded

## Factor Analysis using method =  pa
## Call: psych::fa(r = dom_polycor$correlations, nfactors = 2, n.obs =
nrow(domain_data),
##     rotate = "Promax", scores = "Bartlett", fm = "pa")
## Standardized loadings (pattern matrix) based upon correlation matrix
##                PA1   PA2   h2   u2 com
## R_10         -0.09  0.85 0.61 0.39 1.0
## R_1000        0.59  0.16 0.51 0.49 1.1
## R_1_Mil       0.79 -0.15 0.46 0.54 1.1
## R_1000_Past   0.40  0.17 0.29 0.71 1.4
## R_1000_Exp_0  0.62 -0.04 0.35 0.65 1.0
## R_Snack       0.21  0.22 0.16 0.84 2.0
##
##                        PA1  PA2
## SS loadings           1.55 0.83
## Proportion Var        0.26 0.14
## Cumulative Var        0.26 0.40
## Proportion Explained  0.65 0.35
## Cumulative Proportion 0.65 1.00
##
##  With factor correlations of
##      PA1  PA2
## PA1 1.00 0.73
## PA2 0.73 1.00
##
## Mean item complexity =  1.3
## Test of the hypothesis that 2 factors are sufficient.
##
## The degrees of freedom for the null model are  15  and the objective
function was  1.13 with Chi Square of  1405.23
## The degrees of freedom for the model are 4  and the objective function was
0.01
##
## The root mean square of the residuals (RMSR) is  0.02
## The df corrected root mean square of the residuals is  0.04
##
## The harmonic number of observations is  1245 with the empirical chi square
14.43  with prob <  0.006
## The total number of observations was  1245  with Likelihood Chi Square =
17.8  with prob <  0.0014
```

```
##
## Tucker Lewis Index of factoring reliability =  0.963
## RMSEA index =  0.053  and the 90 % confidence intervals are  0.029 0.079
## BIC =  -10.71
## Fit based upon off diagonal values = 1
## Measures of factor score adequacy
##                                                  PA1  PA2
## Correlation of (regression) scores with factors   0.87 0.85
## Multiple R square of scores with factors          0.76 0.72
## Minimum correlation of possible factor scores     0.52 0.44
```

CFA

```
## lavaan 0.6-6 ended normally after 53 iterations
##
##   Estimator                                         ML
##   Optimization method                           NLMINB
##   Number of free parameters                         13
##
##   Number of observations                          1245
##
## Model Test User Model:
##
##   Test statistic                                35.549
##   Degrees of freedom                                 8
##   P-value (Chi-square)                           0.000
##
## Model Test Baseline Model:
##
##   Test statistic                              1409.575
##   Degrees of freedom                                15
##   P-value                                        0.000
##
## User Model versus Baseline Model:
##
##   Comparative Fit Index (CFI)                    0.980
##   Tucker-Lewis Index (TLI)                       0.963
##
## Loglikelihood and Information Criteria:
##
##   Loglikelihood user model (H0)             -19157.461
##   Loglikelihood unrestricted model (H1)     -19139.687
##
##   Akaike (AIC)                               38340.923
##   Bayesian (BIC)                             38407.572
##   Sample-size adjusted Bayesian (BIC)        38366.278
##
## Root Mean Square Error of Approximation:
##
##   RMSEA                                          0.053
##   90 Percent confidence interval - lower         0.036
```

```
##   90 Percent confidence interval - upper         0.071
##   P-value RMSEA <= 0.05                          0.371
##
## Standardized Root Mean Square Residual:
##
##   SRMR                                           0.024
##
## Parameter Estimates:
##
##   Standard errors                             Standard
##   Information                                 Expected
##   Information saturated (h1) model          Structured
##
## Latent Variables:
##                   Estimate  Std.Err  z-value  P(>|z|)
##   Factor1 =~
##     R_1_Mil          1.000
##     R_1000_Exp_0     0.862    0.056   15.323    0.000
##     R_1000           1.173    0.066   17.653    0.000
##     R_1000_Past      0.881    0.058   15.058    0.000
##   FActor2 =~
##     R_10             1.000
##     R_Snack          0.727    0.068   10.761    0.000
##
## Covariances:
##                   Estimate  Std.Err  z-value  P(>|z|)
##   Factor1 ~~
##     FActor2          4.002    0.308   13.014    0.000
##
## Variances:
##                   Estimate  Std.Err  z-value  P(>|z|)
##    .R_1_Mil          7.497    0.376   19.929    0.000
##    .R_1000_Exp_0     7.337    0.346   21.175    0.000
##    .R_1000           5.521    0.354   15.611    0.000
##    .R_1000_Past      8.204    0.383   21.438    0.000
##    .R_10             6.175    0.512   12.052    0.000
##    .R_Snack         10.734    0.491   21.856    0.000
##     Factor1          4.769    0.450   10.595    0.000
##     FActor2          4.859    0.579    8.387    0.000
```

One Factor

```
## Factor Analysis using method =  pa
## Call: psych::fa(r = dom_polycor$correlations, nfactors = 1, n.obs =
nrow(domain_data),
##     rotate = "Promax", scores = "Bartlett", fm = "pa")
## Standardized loadings (pattern matrix) based upon correlation matrix
##               PA1   h2   u2 com
## R_10         0.57 0.33 0.67   1
```

```
## R_1000       0.73 0.53 0.47   1
## R_1_Mil      0.62 0.38 0.62   1
## R_1000_Past  0.55 0.30 0.70   1
## R_1000_Exp_0 0.57 0.33 0.67   1
## R_Snack      0.39 0.16 0.84   1
##
##                 PA1
## SS loadings    2.02
## Proportion Var 0.34
##
## Mean item complexity =  1
## Test of the hypothesis that 1 factor is sufficient.
##
## The degrees of freedom for the null model are  15  and the objective
function was  1.13 with Chi Square of  1405.23
## The degrees of freedom for the model are 9  and the objective function was
0.04
##
## The root mean square of the residuals (RMSR) is  0.03
## The df corrected root mean square of the residuals is  0.04
##
## The harmonic number of observations is  1245 with the empirical chi square
44.07  with prob <  1.4e-06
## The total number of observations was  1245  with Likelihood Chi Square =
49.23  with prob <  1.5e-07
##
## Tucker Lewis Index of factoring reliability =  0.952
## RMSEA index =  0.06  and the 90 % confidence intervals are  0.044 0.077
## BIC =  -14.91
## Fit based upon off diagonal values = 0.99
## Measures of factor score adequacy
##                                                  PA1
## Correlation of (regression) scores with factors   0.88
## Multiple R square of scores with factors          0.77
## Minimum correlation of possible factor scores     0.54
```

CFA

```
## lavaan 0.6-6 ended normally after 36 iterations
##
##   Estimator                                         ML
##   Optimization method                           NLMINB
##   Number of free parameters                         12
##
##   Number of observations                          1245
##
## Model Test User Model:
##
##   Test statistic                                49.227
##   Degrees of freedom                                 9
##   P-value (Chi-square)                           0.000
```

```
##
## Model Test Baseline Model:
##
##   Test statistic                                1409.575
##   Degrees of freedom                                 15
##   P-value                                         0.000
##
## User Model versus Baseline Model:
##
##   Comparative Fit Index (CFI)                     0.971
##   Tucker-Lewis Index (TLI)                        0.952
##
## Loglikelihood and Information Criteria:
##
##   Loglikelihood user model (H0)             -19164.300
##   Loglikelihood unrestricted model (H1)     -19139.687
##
##   Akaike (AIC)                               38352.601
##   Bayesian (BIC)                             38414.124
##   Sample-size adjusted Bayesian (BIC)        38376.006
##
## Root Mean Square Error of Approximation:
##
##   RMSEA                                          0.060
##   90 Percent confidence interval - lower         0.044
##   90 Percent confidence interval - upper         0.077
##   P-value RMSEA <= 0.05                          0.143
##
## Standardized Root Mean Square Residual:
##
##   SRMR                                           0.029
##
## Parameter Estimates:
##
##   Standard errors                             Standard
##   Information                                 Expected
##   Information saturated (h1) model          Structured
##
## Latent Variables:
##                    Estimate  Std.Err  z-value  P(>|z|)
##   Factor1 =~
##     R_1000            1.000
##     R_1_Mil           0.854    0.048   17.687    0.000
##     R_1000_Exp_0      0.738    0.045   16.525    0.000
##     R_10              0.740    0.045   16.463    0.000
##     R_1000_Past       0.753    0.047   16.188    0.000
##     R_Snack           0.558    0.048   11.733    0.000
##
## Variances:
##                    Estimate  Std.Err  z-value  P(>|z|)
```

```
##    .R_1000            5.617    0.349   16.109    0.000
##    .R_1_Mil           7.546    0.375   20.127    0.000
##    .R_1000_Exp_0      7.358    0.346   21.287    0.000
##    .R_10              7.492    0.351   21.336    0.000
##    .R_1000_Past       8.231    0.382   21.548    0.000
##    .R_Snack          11.285    0.478   23.610    0.000
##     Factor1           6.466    0.505   12.811    0.000
```

ANOVA

Multilevel Model Fit Comarison

Multilevel Model Fit Comarison

	Three_Factor	Two_Factor
Two_Factor	0.0003811 ***	
One_Factor	1.825e-06 ***	0.000217 ***