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 \*\*\* |