Model Fit Indices (SEM)

\[ \chi^2 (df_h) = (n - 1) F[S, \Sigma(\hat{\theta})] \]

and \[ \chi^2_h / df \]

\[ ACI = \chi^2_h - 2df \]

\[ NFI = \frac{\chi^2_i - \chi^2_h}{\chi^2_i} \]

\[ NNFI = \frac{\chi^2_i / df_i - \chi^2_h / df_h}{\chi^2_i / df_i} \]

\[ GFI = 1 - \frac{F[S, \Sigma(\hat{\theta})]}{F[S, \Sigma(\theta)_i]} \]

\[ AGFI = 1 - \left( \frac{c}{df_h} \right) \frac{F[S, \Sigma(\hat{\theta})]}{F[S, \Sigma(\theta)_i]} \]

\[ RMSEA = \sqrt{\frac{(\chi^2_h / df_h) - 1}{n}} \]

S Sample Variance/Covariance Matrix

\( \Sigma(\theta)_h \) Variance/Covariance Matrix implied by the population parameters

\( \Sigma(\hat{\theta})_h \) Variance/Covariance Matrix implied by the sample-estimate parameters

C Number of variances and covariances

F F is maximum likelihood discrepancy function
$\chi^2$: "Chi square", compares the observed variance-covariance matrix to the predicted variance-covariance matrix, theoretically ranges from 0 (perfect fit) to $+\infty$ (poor fit), considered satisfactory when non significant ($p > .05$), problems: highly dependent on $N$ (meaningless with large samples), difficult to accept the null hypothesis.

$\chi^2/df$: Is considered satisfactory when $< 3$ in large samples ($N > 200$), $< 2.5$ in medium-sized samples ($100 < N < 200$), and $< 2$ in small samples ($N < 100$).

AIC: "Akaike Information Criterion", like $\chi^2$ but adjusts for model complexity, theoretically ranges from $-\infty$ (perfect fit) to $+\infty$ (poor fit), is generally used to compare competing models (the one with the lowest AIC is preferred).

NFI: "Normed Fit Index" (EQS), proportion in the improvement of the overall fit of the hypothesized model ($h$) compared to the independence model ($i$), theoretically ranges from 0 (poor fit) to 1 (perfect fit), considered satisfactory when $> .90$

NNFI: "Non-Normed Fit Index" (EQS), like NFI but adjusts for model complexity, theoretically ranges from 0 (poor fit) to 1 (perfect fit), considered satisfactory when $> .90$

GFI: "Goodness of Fit Index" (LISREL), like multiple r-squared, theoretically ranges from 0 (poor fit) to 1 (perfect fit), considered satisfactory when $> .90$

AGFI: "Adjusted Goodness of Fit Index" (LISREL), like GFI but adjusts for model complexity (like adjusted multiple r-squared), theoretically ranges from 0 (poor fit) to 1 (perfect fit), considered satisfactory when $> .90$

RMSEA: "Root Mean Square Error of Approximation", calculates the size of the standardized residual correlations, theoretically ranges from 0 (perfect fit) to 1 (poor fit), considered satisfactory when $< .05$