Reliability Coefficients Using R

 # The dataset <ELS04 admin school climate.csv> shows responses of 657 US high school administrators to 12 survey items from the 2004 wave of the Education Longitudinal Study of 2002-2006. These items asked school principals to rate various aspects of school climate (e.g., how hard do students work?, is there much bullying/school violence?) Labels for each item are given below. The rating scale for each item ranged from 1 (not at all accurate) to 5 (very accurate).

######## **Annotated Output/Results** #########

 # Compute reliability coefficient omega for the general factor in a one-factor model

```
> omega(schoolclimatedata, nfactors = 1, fm = "ml")
```

```
Alpha:                  0.87
Omega Total             0.88
```

```
Schmid Leiman Factor loadings greater than  0.2
            g  F1*    h2    u2 p2
stmorale  0.66      0.43 0.57  1
press     0.79      0.62 0.38  1
tcmorale  0.67      0.46 0.54  1
hilearn   0.70      0.49 0.51  1
hwexpect  0.63      0.40 0.60  1
discipln  0.54      0.29 0.71  1
structur  0.61      0.37 0.63  1
negtchrs- 0.54      0.30 0.70  1
lowmotiv- 0.54      0.29 0.71  1
academic  0.58      0.34 0.66  1
conflict- 0.36      0.13 0.87  1
indivlrn  0.60      0.36 0.64  1
```

 # As demonstrated previously, this one factor model does not fit the data very well, so it may not make sense to compute a reliability coefficient for one total score from all the items. (This output about "10% confidence intervals" should read "90% confidence intervals.")

The number of observations was 657 with Chi Square = 472.83 with prob < 3.1e-68

RMSEA index = 0.109 and the 10 % confidence intervals are 0.1 0.118

###############################

 # Compute coefficient omega for the general factor score from the "bifactor" transformation of the 3-factor model (1 'general' and 3 'specific' factors)
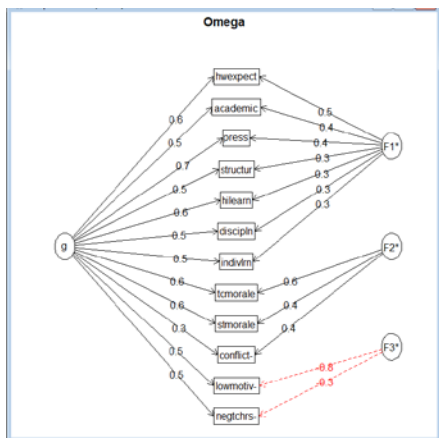
Interpretation of all of these coefficients is described here (p. 11-12): http://personality-project.org/r/psych/HowTo/omega.pdf

```
> omega(schoolclimatedata, nfactors = 3, rotate = "promax", fm = "ml")
```

```
Alpha:                  0.87
Omega Hierarchical:     0.7
Omega Total             0.9
```

**# The model with 1 general and 3 specific factors fits the data acceptably, judging from
the RMSEA**


```
Schmid Leiman Factor loadings greater than  0.2
                 g    F1*    F2*    F3*    h2    u2    p2
stmorale  0.59          0.40          0.52 0.48 0.67
press     0.69  0.36                  0.63 0.37 0.75
tcmorale  0.63          0.57          0.73 0.27 0.55
hilearn   0.62  0.29                  0.50 0.50 0.76
hwexpect  0.57  0.47                  0.56 0.44 0.58
discipln  0.48  0.27                  0.31 0.69 0.73
structur  0.53  0.35                  0.41 0.59 0.69
negtchrs- 0.48               -0.30 0.35 0.65 0.66
lowmotiv- 0.54               -0.84 0.99 0.01 0.30
academic  0.51  0.36                  0.39 0.61 0.67
conflict- 0.32          0.37          0.25 0.75 0.42
indivlrn  0.52  0.26                  0.36 0.64 0.76
```

The number of observations was 657 with Chi Square = 165.66 with prob <
1.4e-19

RMSEA index = 0.078

**# Proportion of variance in total scores accounted for by administrators' score on the
general factor, and each specific factor.** (Perhaps better described as an index of sum
total score adequacy, indicating how effectively the sum total score represents each
underlying latent factor. Should be high for the general factor.)

```
Measures of factor score adequacy
                                      g    F1*    F2*  F3*
Multiple R square of scores with factors  0.72   0.38   0.49 0.87
```

 # Which reliability coefficient(s) to report? If one school climate score will be
computed for each school, omega general for the total score (0.70) is most relevant to
report. If three climate dimension scores will be computed for each school, omega total
for each subscale is most relevant to report.

```
 Total, General and Subset omega for each subset
                                      g    F1*  F2*  F3*
Omega total for total scores and subscales    0.90 0.84 0.75 0.77
Omega general for total scores and subscales  0.70 0.61 0.43 0.34
```