(Bob Pearson's Cheat Sheet for)

SCALE VALIDATION

I) Item analysis
   A) Frequencies (univariate descriptives)
      1) include mean, med, std, min, max, skew, kurtosis
      2) skim maximums for typos (e.g. 11 or 22 for value of 5-point scale)
      3) Skim the SD. Item with too little variability will hurt the scale. For 5-point likert scale items, flag and examine SDs well below 1
      4) Check that items are roughly normal-ish. Examine:
         (i) Skew should be within (-1, 1)
         (ii) Kurtosis should be within (-1, 2)
         (iii)Might also skim item histograms.
      5) Check missing value counts
   B) Recode values as needed (e.g. reverse scoring some items)

II) Structure - Use factor analysis (FA) to examine the correlation structure among items. There are several important FA decisions:

   A) Identifying the number of factors
      1) Eigenvalues >1 (Kaiser-Guttman criterion) – should only be considered a rough estimate, and probably overestimate. The poor performance of this rule is well known.
      2) Scree plot – useful if there is a clear elbow. This should be preferred to EV>1
      3) Suggestion: check multiple factor solutions for interpretability and theoretical considerations

   B) Extraction Method – Use method that most fits your theory
      1) Principal Components (PCA)
         (i) Explains maximum amount of variance
         (ii) Assumes variables are perfectly measured
         (iii)more appropriate for data reduction than identifying underlying factors
      2) Common Factor Methods, usually abbreviated EFA (e.g. MLFA, PAF)
         (i) Examines only the common variance and excludes variance unique to each variable
         (ii) Factor loadings are more likely to replicate across studies
      3) Suggestion – For most psychometric applications, use EFA instead of PCA

   C) Rotation
      1) Major choice: oblique vs. orthogonal
         (i) Orthogonal (varimax)
            (a) Factors not allowed to correlate in model
            (b) simpler model (easier to interpret in some ways)
         (ii) Oblique (e.g. promax)
            (a) Allows factors to be correlated
            (b) may result in simpler structure (easier to interpret loadings)

(c) Examine pattern matrix to identify and name factors
(d) Also examine estimates of the inter-factor correlations for each considered solution
(e) Then also examine the structure matrix for your final solution to gain greater insight.
(f) Factor correlations can be also factor analyzed (higher order FA)

(iii) Suggestion – try oblique first, but if factors appear weakly correlated then use orthogonal

III) Reliability

A) Run on subscales if you believe them to exist
1) possibly based on EFA
2) any set of items for which you plan to use the mean or sum

B) Use assumes that the set of items measures one trait (items are unidimensional).
1) So if subscales are present, reliability analysis of the entire scale violates this assumption

C) Methodology
1) Use Cronbach's alpha (internal consistency). This is equivalent to KR-20 if items are dichotomous
2) Examine "scale if item deleted" – compare to current estimate
3) Remove items (one at a time) if doing so substantially improves reliability, unless they are "integral" to scale

IV) General advice - "Bad" items will generally be identifiable in multiple ways: low loadings, hurt the scale reliability, low variance, skewed, etc.)