Activity: Assessing Internal Consistency

The purpose of this exercise is to develop proficiency with assessing internal consistency for a set of items, and to practice computing and assessing various item-fit statistics.

The data for this exercise is provided in the link below. The data are responses from 19 students who completed the "Dissertation Process Survey."

http://www.bwgriffin.com/gsu/courses/edur9131/2018spr-assignments/04-internal-consistency-data.pdf

Note that there are 10 items on this questionnaire. The even numbered items (2, 4, 6, 8, and 10) were designed to measure anxiety toward the dissertation process. The odd numbered items were designed to measure self-efficacy toward the dissertation process. Briefly described, the two latent variables can be summarized as follows.

Anxiety toward the dissertation process = feeling or expressing fear and apprehension about the dissertation process or defense.

Self-efficacy toward the dissertation process = having or expressing confidence in one's ability to complete successfully the dissertation process and defense.

What to do:

(a) Enter the data into a spreadsheet or directly into whichever statistical software you use.

(a) After data entry calculate internal consistency for anxiety items, and item-fit (scale) statistics (e.g., alpha if item removed, corrected item-total correlations, inter-item correlations).

(b) Examine these items – carefully review wording of each item and examine item-fit statistics – and determine whether any should be dropped. Remember, this is not simply a mechanical decision. If the item appears to be a theoretically good fit to the latent variable, but the statistics for that item are mediocre, it is probably better to retain the item than remove it. If the statistics are poor, however, that suggest that the item, even if theoretically important, may require revision.

(c) If some are dropped, recalculate internal consistency and re-examine the remaining items.

(d) Repeat these steps as necessary until the final sub-set of the items is obtained. Once the final set of items is obtained, explain why any items were removed, and interpret the alpha that was finally obtained.

(e) Repeat the process described above for the self-efficacy items.

What to submit for this exercise:

Nothing to submit; answers are provided below. Compare your answers with those provided.

Please attempt to complete this activity before viewing answers so you can assess better your reasoning with internal consistency and item-fit statistics.

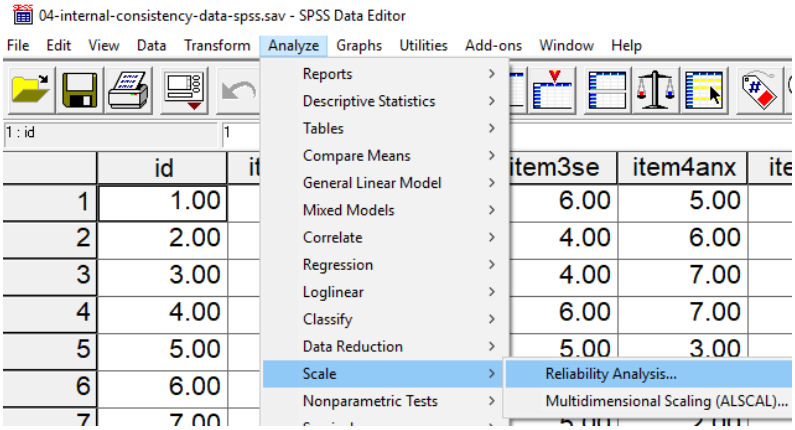
Answers

SPSS data for this activity can be found here:

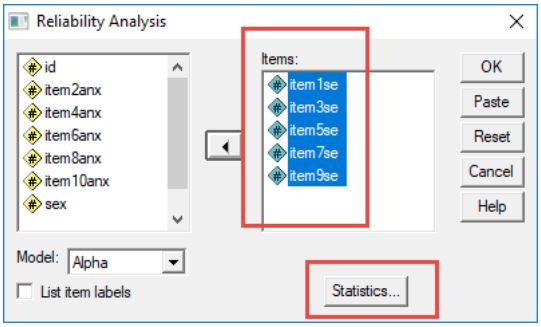
http://www.bwgriffin.com/gsu/courses/edur9131/2018spr-assignments/04-internal-consistency-data-spss.sav

1. Dissertation Self-efficacy

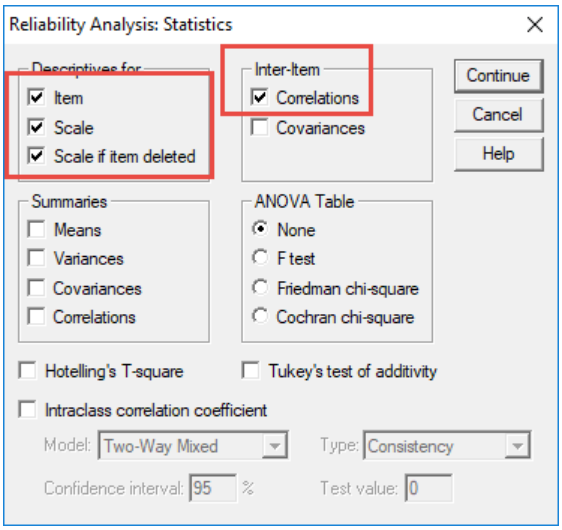
SPSS Commands: **Analyze→Scale→Reliability Analysis**



Move self-efficacy items (odd numbered items) to the Items box; then click on **Statistics** button.



Select the following item statistics, the click **Continue** then **OK** to obtain results.



SPSS Results

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.783	.796	5

Inter-Item Correlation Matrix

	item1se	item3se	item5se	item7se	item9se
item1se	1.000	.380	.692	.425	.514
item3se	.380	1.000	.524	.303	.634
item5se	.692	.524	1.000	.112	.570
item7se	.425	.303	.112	1.000	.236
item9se	.514	.634	.570	.236	1.000

The covariance matrix is calculated and used in the analysis.

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
item1se	22.1053	10.099	.666	.623	.716
item3se	22.9474	9.053	.618	.491	.721
item5se	21.9474	10.164	.611	.630	.730
item7se	23.4737	10.596	.328	.319	.825
item9se	22.7895	8.842	.650	.504	.709

Step 1

- Odd numbered items measure self-efficacy
- $\alpha = .783$
- Correlations among items are all positive which is a good sign that items are demonstrating similar response patterns
- Item-total correlations all .60+ except for item 7
- Weakest item-total correlation is item 7 with .328
- If item 7 dropped, alpha increases to $\alpha = .825$
- Item 7 is slightly different in wording from others (focus on literature and theories), but item 7 represents a legitimate component of the dissertation process, so removing item 7 could threaten content validity of this latent variable
- There is no compelling reason to drop item 7 since alpha is not overly affected by inclusion or removal of item 7, and since item 7 appears to be content valid, it will be retained

Step 2

- If item 7 were removed, the following results:
- $\alpha = .825$
- Item-total correlations all .6+
- Stop at step 2; alpha level achieved is the highest possible with these data and self-efficacy items, but if item 7 removed, the cost could be lessened validity of the measure for self-efficacy

2. Dissertation Anxiety

Step 1

- SPSS results not shown, but compare your results with the results shown below
- Even numbered items measure anxiety
- $\alpha = .871$
- Can stop here, item-total correlations all .69+ except item 8 (.502), and the alpha obtained demonstrates very good internal consistency
- If item 8 removed, $\alpha = .89$, but little compelling reason to remove item 8 (unless it is redundant, or one wishes to reduce number of items on questionnaire)