Activity: Reverse Scoring and Composite Variables

As part of a cyber-harassment study at Georgia Southern, students were asked the following questions.

Questionnaire Items

3. What is your university grade point average (GPA) – if you don't know precisely, please estimate your GPA:
    1. 0.00 to 0.50
    2. 0.51 to 1.00
    3. 1.01 to 1.50
    4. 1.51 to 2.00
    5. 2.01 to 2.50
    6. 2.51 to 3.00
    7. 3.01 to 3.50
    8. 3.51 to 4.00

	No or almost never	Rarely	Sometimes	Often	Almost Always
4. Do you think about dropping out of university/college?	1	2	3	4	5
5. Do you think about transferring to another university/college?	1	2	3	4	5
6. Do you think about taking a break from university/college studies for a while and maybe returning later?	1	2	3	4	5

	Not at all Confident	Slightly Confident	Moderately Confident	Mostly Confident	Extremely Confident
7. How confident are you that you will graduate from a university/college?	1	2	3	4	5

Questions 4, 5, 6 and 7 were designed to assess respondents' confidence that they would graduate from a college or university.

The SPSS data file for responses to these questions is linked below.

https://bwgriffin.com/gsu/courses/edur8331/edur8331-activities/Composite-Scores/EDUR-8331-composite-scores.sav

The data file contains five variables:

gpa = responses to question 3 about GPA
Q4 = Question 4 above
Q5 = Question 5 above
Q6 = Question 6 above
Q7 = Question 7 above

As noted, Q4, Q5, Q6, and Q7 are designed to form a composite variable of graduation confidence.

Activity:

1. Assess the internal consistency (Cronbach's alpha, Pearson correlations, item-total correlations, etc.) for Q4, Q5, Q6, Q7; goal is to take actions that will produce a reliable composite score

2. Form a composite variable of these items

3. Correlate the composite variable with gpa and interpret this correlation

Answers are provided below. Please attempt to complete this activity before viewing answers so you can assess better your reasoning for computing composite scores.

Answers

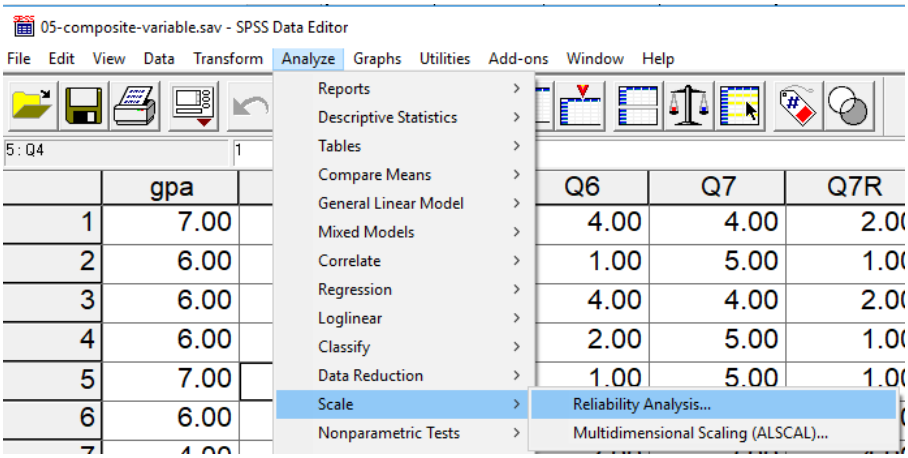
1. Internal Consistency Results

(a) Question wording indicates that Q7 is a reverse item compared with Q4, Q5 and Q6. For Q7, one who is very confident they will graduate will respond with a high score (e.g., 5), whereas for Q4, Q5 and Q6, low responses indicate greater confidence (e.g., 1).

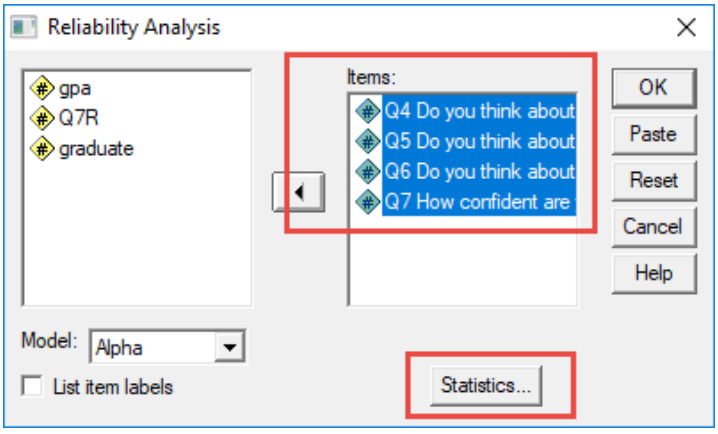
(b) This suggests Q7 should correlate negative with items Q4, Q5, and Q6. The negative correlation will produce a low Cronbach's alpha if Q7 does correlate with the other items.

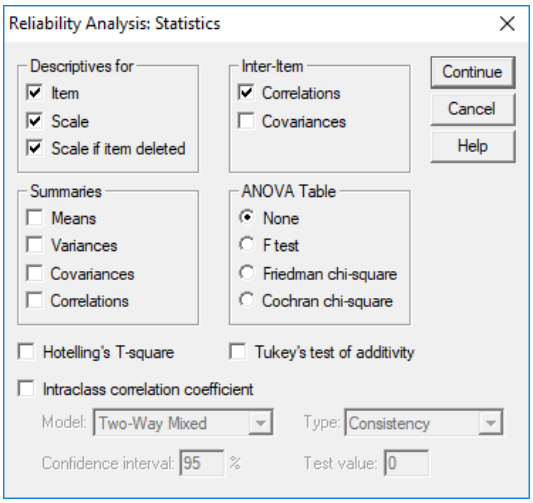
(c) SPSS results show α = .16 and Q7 has negative correlations with other items.

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



Select variables and choose statistics





SPSS Results

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.163	.008	4

Inter-Item Correlation Matrix

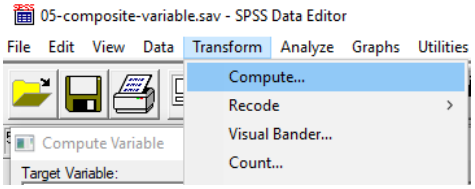
	Q4 Do you think about dropping out of university/college?	Q5 Do you think about transferring to another university/college?	Q6 Do you think about taking a break from university/college studies for a while and maybe returning later?	Q7 How confident are you that you will graduate from a university/college?
Q4 Do you think about dropping out of university/college?	1.000	.274	.365	-.378
Q5 Do you think about transferring to another university/college?	.274	1.000	.525	-.299
Q6 Do you think about taking a break from university/college studies for a while and maybe returning later?	.365	.525	1.000	-.475
Q7 How confident are you that you will graduate from a university/college?	-.378	-.299	-.475	1.000

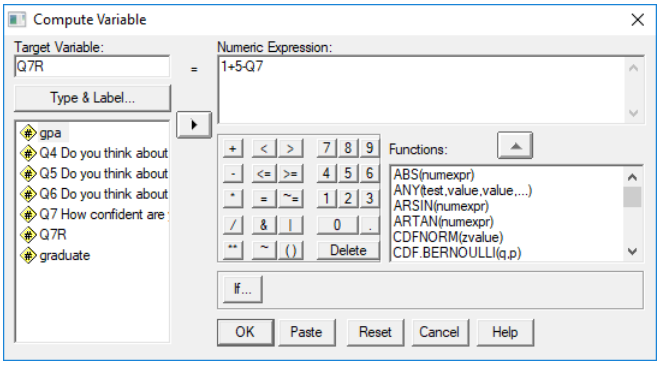
The covariance matrix is calculated and used in the analysis.

2. Reverse Code Q7

Formula
Q7R = (minimum) + (maximum) – Q7

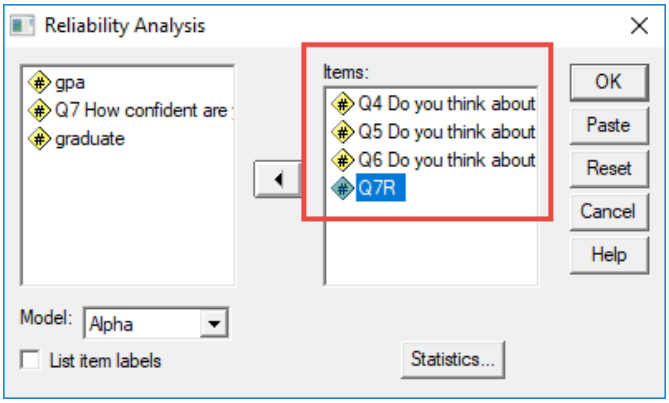
SPSS: **Transform→ Compute**





3. Internal Consistency Results with reversed Q7

Run the same SPSS reliability analysis as before, but remove Q7 and insert Q7R.



SPSS Results

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.713	.715	4

Inter-Item Correlation Matrix

	Q4 Do you think about dropping out of university/college?	Q5 Do you think about transferring to another university/college?	Q6 Do you think about taking a break from university/college studies for a while and maybe returning later?	Q7R
Q4 Do you think about dropping out of university/college?	1.000	.274	.365	.378
Q5 Do you think about transferring to another university/college?	.274	1.000	.525	.299
Q6 Do you think about taking a break from university/college studies for a while and maybe returning later?	.365	.525	1.000	.475
Q7R	.378	.299	.475	1.000

The covariance matrix is calculated and used in the analysis.

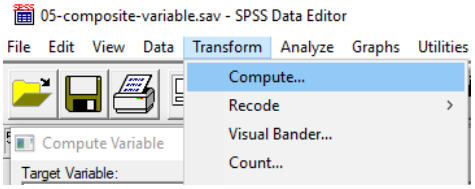
Item-Total Statistics

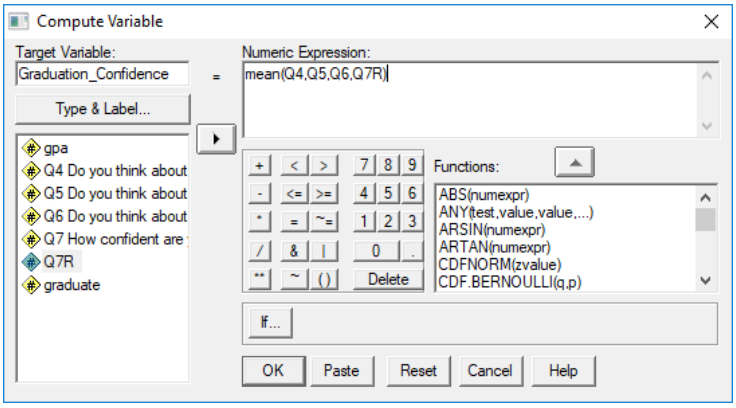
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Q4 Do you think about dropping out of university/college?	5.6404	6.074	.424	.194	.696
Q5 Do you think about transferring to another university/college?	6.0000	5.591	.481	.284	.665
Q6 Do you think about taking a break from university/college studies for a while and maybe returning later?	5.8315	4.983	.617	.403	.572
Q7R	6.2921	6.391	.499	.275	.658

Note that Q7R correlates positively with all other items, and Cronbach's alpha cannot be improved by removal of any items. These four items seem to provide the best possible fit and will be used to form the composite variable for graduation confidence.

4. Composite Variable

SPSS: **Transform→ Compute**

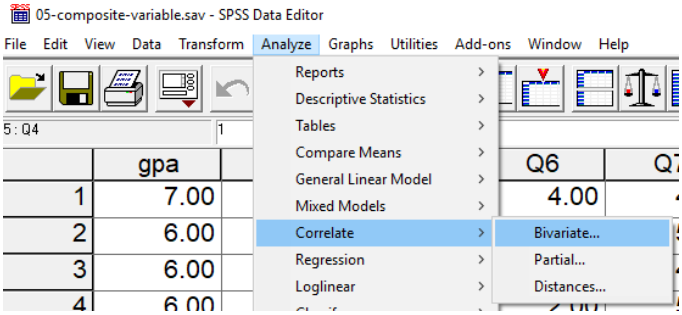




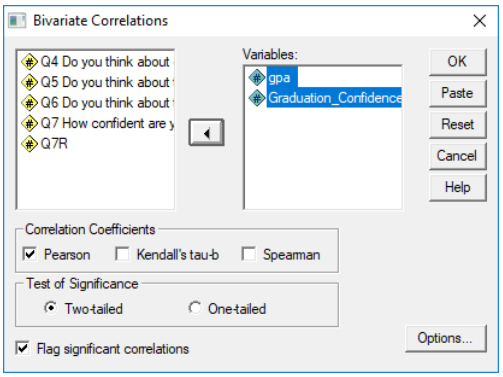
Note that composite variable is named Graduation_Confidence, and the mean of Q4, Q5, Q5 and Q7R is used as the composite variable. Note that Q7R, not Q7, is used since it produced greater internal consistency than did Q7.

5. Correlation with GPA

Analyze→Correlate→Bivariate



Move gpa and Graduation_Confidence to the variables box then click **OK** to run the analysis.



SPSS Results

Correlations

		gpa	Graduation_Confidence
gpa	Pearson Correlation	1	-.380(**)
	Sig. (2-tailed)		.000
	N	89	89
Graduation_Confidence	Pearson Correlation	-.380(**)	1
	Sig. (2-tailed)	.000	
	N	89	89

** Correlation is significant at the 0.01 level (2-tailed).

Interpretation:

GPA correlates -.38 (significant at the .01 level) with graduation confidence. For graduation confidence note that lower scores indicate more confidence and higher scores indicate lower confidence. Since low scores indicate more confidence, the negative correlation shows that as confidence in graduation from a university of college increases, GPA also increases.