Correlation Matrix -- Correlations Among Several Quantitative Variables

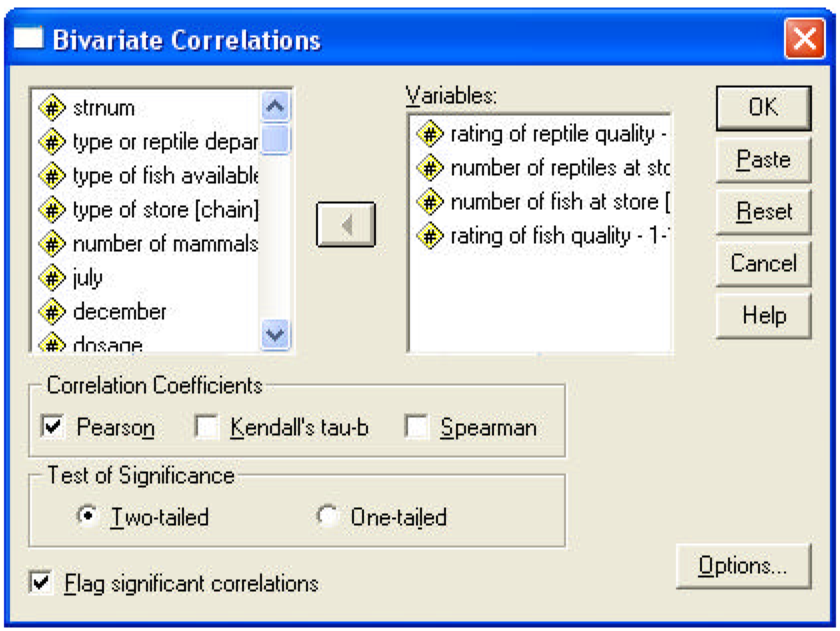
Application: Sometimes there are multiple quantitative variables, and the desire to know correlations among them.

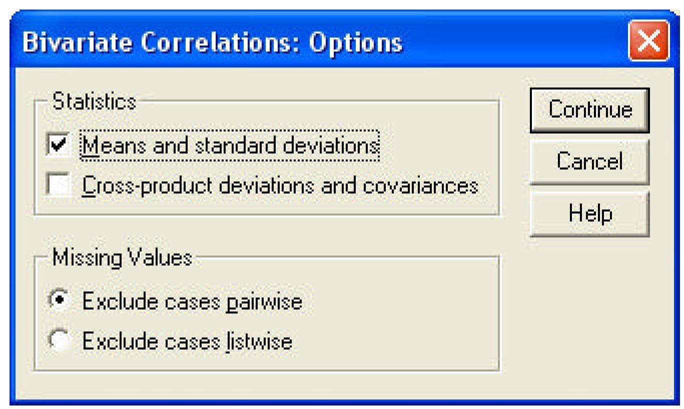
Research Hypothesis/Questions: Knowing that store owners are often over-worked, the researcher hypothesized that stores with fewer fish would have healthier fish (thus predicting a negative or inverse relationship between these variables in this population). Based on the same premise as above, the researcher also hypothesized that stores with fewer reptiles would have healthier reptiles (thus predicting an inverse or negative correlation between these variables; the H0: r=0).

Sometimes you don't start with a research hypothesis. For example the researcher wanted to know if there was a relationship between the quality of the fish and reptiles in stores, but had no basis for making a specific hypothesis. Also, not every correlation in a matrix is necessarily meaningful. For example, it is not immediately obvious why we would be interested in the relationship between the number of fish and the quality of reptiles displayed in a store.

Analyze ➔ Correlate ➔ Bivariate

- highlight each of the desired variables and click the arrow button
- be sure "Pearson" and "Two-tailed" buttons are checked
- "Options" — check that you want "Means and standard deviations"





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OUTPUT:

Descriptive Statistics

	Mean	Std. Deviation	N
number of fish at store	23.92	9.605	12
rating of fish quality - 1-10 scale	6.67	2.146	12
number of reptiles at store	9.25	4.267	12
rating of reptile quality - 1-10 scale	5.67	2.498	12

Correlations

		number of fish at store	rating of fish quality - 1-10 scale	number of reptiles at store	rating of reptile quality - 1-10 scale
number of fish at sto	Pearson Correlati	1	-.857**	.768**	.074
	Sig. (2-tailed)	.	.000	.004	.818
	N	12	12	12	12
rating of fish quality 1-10 scale	Pearson Correlati	-.857**	1	-.745**	-.311
	Sig. (2-tailed)	.000	.	.005	.325
	N	12	12	12	12
number of reptiles a store	Pearson Correlati	.768**	-.745**	1	-.009
	Sig. (2-tailed)	.004	.005	.	.979
	N	12	12	12	12
rating of reptile qua - 1-10 scale	Pearson Correlati	.074	-.311	-.009	1
	Sig. (2-tailed)	.818	.325	.979	.
	N	12	12	12	12

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

Reporting the Results: Notice how you can combine the results of more than one correlation analysis to help organize the results into a "story". Here is how we might present these data (notice the mention of research hypotheses when they exist). Usually the table only includes the "lower off-diagonal" of the correlation matrix (notice that the upper-right and lower-left portions of the matrx have redundant information -- corr of fishnum and fishgood = -.8570 = corr of fishgood and fishnum).

Table 1 shows the means and standard deviations of each variable, as well as the correlations among them. As hypothesized, there was a significant negative correlation between the number and quality of fish in these stores. Contrary to the hypothesis of a negative correlation between the number and quality of reptiles in these stores, there was no significant correlation. There was a significant correlation between the number of fish and reptiles in these stores, however, there was not a significant correlation between the quality of those fish and reptiles.

Table 1.
Means, standard deviations and intercorrelations (and p-values) among the quantity and quality variables (N=12).

Variable	mean	std	# Fish	# Reptiles	Quality of Fish
1 # Fish	23.93	9.61			
2 # Reptiles	9.25	4.27	.768(.004)		
3 Quality of Fish	6.67	2.15	-.857(.001)	-.745(.005)	
4 Quality of Reptiles	5.67	2.90	.075(.818)	-.009(.979)	-.311(.325)