References

Leske J.S. (1991) Internal psychometric properties of the Critical Care Family Needs Inventory. *Heart and Lung* **20**, 236–244.

Yeh M.L., Gift A.G. & Soeken K.L. (1994) Coping in spouses of patients with acute myocardial infarction in Taiwan. *Heart and Lung* **23**, 106–111.

INFORMATION POINT:

Spearman's Rank Correlation Test

Correlation summarizes the strength of relationship between two variables, but it is important to remember that *correlation is not causation*. We require that the two variables, X and Y, are paired observations, for example height and weight for each patient in the sample. Several different correlation coefficients can be calculated, but the two most commonly used are Pearson's correlation coefficient and Spearman's rank correlation coefficient.

Pearson's correlation coefficient requires both variables to be measured on an interval or ratio scale and the calculation is based on the actual values.

Spearman's rank coefficient requires data that are at least ordinal and the calculation, which is the same as for Pearson correlation, is carried out on the ranks of the data. Each variable is ranked separately by putting the values of the variable in order and numbering them: the lowest value is given rank 1, the next lowest is given rank 2 and so on. If two data values for the variable are the same they are given averaged ranks, so if they would have been ranked 14 and 15 then they both receive rank 14.5.

Altman (1991) describes the calculations. Spearman's rank correlation coefficient is used as a measure of linear relationship between two sets of ranked data, that is it measures how tightly the ranked data clusters around a straight line. Spearman's rank correlation coefficient, like all other correlation coefficients, will take a value between −1 and +1. A positive correlation is one in which the ranks of both variables increase together. A negative correlation is one in which the ranks of one variable increase as the ranks of the other variable decrease. A correlation of +1 or −1 will arise if the relationship between the two variables is exactly linear. A correlation close to zero means there is no linear relationship between the ranks.

We can calculate confidence intervals or carry out hypothesis tests, for example to test whether the correlation is zero. To perform such tests on Pearson's correlation coefficient it is necessary to assume that both variables have a normal distribution. No such assumption is necessary for tests on Spearman's rank correlation. Thus we would elect to use Spearman's coefficient rather than Pearson's coefficient if either the data are ordinal or ranked or if it is unreasonable to assume that the variables are normally distributed. Spearman's correlation coefficient should be used more often; it gives as much information as the Pearson correlation coefficient and is of wider validity, as discussed by Altman (1991).

Further reading

Altman D.G. (1991) *Practical Statistics for Medical Research*. Chapman & Hall, London, pp. 285–288.