Appendix F

Glossary of statistical terms

Alpha reliability coefficient

Also known as Cronbach's Alpha coefficient, an Alpha reliability coefficient is a numerical expression of the degree of relationship between items that are intended to measure the same phenomenon. When these related items are added to form a scale the reliability coefficient indicates the extent to which the scale yields a dependable measure of the phenomenon, that is, it measures aspects of the same underlying phenomenon with each item of the scale. A high Alpha of around 0.80 would occur if items measured almost identical aspects; an Alpha of around 0.70 would indicate a reliable scale with items that measured overlapping but not completely identical aspects of the phenomenon.

Correlation

A correlation is a relationship between two variables such that a systematic change in one variable is accompanied by a systematic change in another. Where the correlation coefficient is positive, an increase in the magnitude of one variable is accompanied by an increase in the magnitude of the other. Where the correlation coefficient is negative, an increase in the magnitude of one variable is accompanied by a decrease in the magnitude of the other. A correlation coefficient of zero indicates no relationship between two variables. A correlation coefficient of one indicates a perfect relationship between two variables such that a change in one is always associated with an equivalent change in the other.

A correlation between two variables describes the strength of association between them. For example, for the consumer survey item 'Did the agency tell you that you can voice any concerns you have about them to outside authorities?', a *yes* response was coded as 1 and a *no* response was coded as 2. The standards were scored with 'not met' coded as 0, 'partly met' coded as 1, and 'met' coded as 2. The correlation of this item with Standard 6.1 was –0.33. Hence where consumers indicate that the agency has not told them they could complain to outside authorities, it can be said to be somewhat likely that the agency will score poorly against Standard 6.1 (consumers are aware of the complaints process).

When correlations are high they can be used to make predictions about the expected size of one variable given the size of another. The correlations obtained for the data in this study, however, are generally not high enough to make accurate predictions. A correlation of 0.33 would explain only 11% of the variance in the predicted variable—a large margin of error since 89% of variation in scores against the standard can not be explained by the relationship with the consumer responses.

It should be noted that a correlation does not imply a causal relationship. If two measures, A and B, are correlated, it may be that A causes B, that B causes A, or that A and B are both caused by a third factor.

Factor analysis

A factor analysis is a statistical procedure which identifies a smaller number of dimensions or factors within a larger set of items by examination of correlation coefficients. Variables that correlate highly together are identified as representing a factor. This emergent factor may be considered as a source variable that accounts for the inter-relations between the variables. Variables that do not correlate with each other are identified as representing independent factors, that is, different underlying dimensions.

The factors that emerge from a factor analysis represent underlying regularities in the data, but the meaning of these regularities must be inferred by subjective examination. They may reflect a theoretically expected dimension or they may occur as a result of some other unanticipated phenomenon.

Mean

The mean is calculated by adding together all the item values in a series and dividing the total by the number of items in that series.

Standard deviation (SD)

The standard deviation is calculated by subtracting each item value from the mean item value in the series, to give a measure of each item's distance from the mean. This score is then multiplied by itself (squared). These squared distance scores are then summed for all items and divided by the number of items in that series minus one (for estimating to a population). The standard deviation is calculated when the square root of this term is taken.

The standard deviation represents the variability of scores around the mean. For data that is normally distributed (as is the data in this study) approximately 68% of scores fall within one standard deviation of the mean.[1] For example, if the mean Instrument Score for all HACC agencies is 1.56 and the standard deviation is 0.39, then approximately 68% of HACC agencies have Instrument Scores that fall between (1.56–0.39) = 1.17 and (1.56 + 0.39) = 1.95.

t-test

A *t*-test provides a method of determining whether the scores of two groups differ more than would be expected by chance. Taking into account the standard deviation of scores within each group and the number of members in each group, a comparison is made of

1. Aczel A D 1989. Complete business statistics. Second edition. Irwin: Homewood, Il.

the mean scores for each of the two groups. The calculated *t* statistics allows this comparison. The value of this statistic has an associated probability of occurrence. Values of *t* considered to be significant are those where the probability of occurrence by chance is less than 5% ($p < 0.05$).

For example, the mean Instrument Score for agencies which undertook peer review was 1.64 according to agency ratings, and 1.20 according to assessor ratings. The *t*-test for the comparison of these means was 3.21 with an associated probability of 0.01. This is a statistically significant result. In other words, there is a consistent difference between Instrument Scores given by a peer review assessor and those given by the agencies; one that is unlikely to be a product of chance. The likelihood of this difference occurring by chance is less than 5% (the conventionally determined cut-off for significance tests).