

NOTE: Practical Questions are in *italics*, while the suggested answers are in **bold face** type.

Module 2: Statistics Review for Psychological Measurement

Practical Questions

1. *Are descriptive statistics or inferential statistics used more in applied psychological measurement?*

While both descriptive and inferential statistics are used in applied psychological measurement, more often than not we are most interested in simply describing a set of test scores with frequency tables, scatter plots, and descriptive statistics point estimates, such as means, standard deviations, and skewness.

2. *Why are we more likely to use estimation rather than statistical significance testing in applied psychological measurement?*

Because we are more interested in estimating individuals' true scores on a given construct, we would be most interested in creating confidence intervals (a form of estimation). We do occasionally compare groups (control versus experimental or men versus women) and thus use statistical significance testing, but even in that case, we typically follow up the statistical significance tests with a point estimate of effect size.

3. *How do descriptive statistics and standardized scores allow us to interpret a set of test scores? Why?*

Descriptive statistics allow us to summarize an entire set of (test) scores. By creating frequency distributions, histograms, and polygons we can display the test data. Point estimates such as means and standard deviations also help us summarize a group of test data. However, standardizing the test scores allows us to compare the test scores from different distributions directly. For example, a T-score of 60 (one standard deviation above the mean) is instantly recognized as being a higher score relative to a z-score of .75 (three quarters of one standard deviation above the mean).

4. *What are the advantages of using a scatter plot in addition to the Pearson product moment correlation?*

While a scatter plot does give some indication of the strength and direction of a relationship between two variables, those properties of the relationship can also (and more precisely) be obtained from the correlation index directly. However, the real advantage of inspecting the scatter plot before taking the correlation index at face value is that the scatter plot will identify: 1) possible univariate and bivariate outliers, 2) non-linear relationships, 3) potential restriction of range issues, 4) possible sub-

population differences (e.g., different relationships for men versus women), and 5) heteroscedasticity along the regression line. Thus, if the scatter plot is not inspected first, then the researcher may erroneously conclude that there is no (or a very small) relationship between two variables when in fact one of the factors above is suppressing the correlation index making it appear smaller than it really is.

5. *What does a 95% confidence interval of the mean tell us? How about a 99% confidence interval for an individual score?*

The 95% confidence interval of the mean tells us that we are 95% certain that our interval, as constructed, includes the population parameter (μ). However, we must be diligent and remind students that μ is a constant and not a variable. Therefore, what changes from study to study is the interval we construct, based on the sample mean, variability, and size, not μ .

The 99% confidence interval for an individual score requires that we know the standard error of measurement (which requires knowledge of the sample standard deviation and the reliability of the test). Similar to the confidence interval for the mean, we are attempting to obtain an interval estimate for a constant (not a variable). In this case, an individual's True Score. Thus, our interpretation is very similar. Specifically, the probability of our interval, as constructed, containing an individual's true score is .99.