

### A note on statistical relationships

A p-value is a number used to determine if a result is statistically significant and so is unlikely to be simply the result of chance. A p-value of less than .05 (less than 5% chance the result is simply from randomness) is considered to be statistically significant. A p-value of less than .01 (less than 1% chance the result is simply from randomness) is considered to be highly statistically significant.

An r-value is called Pearson's r or a correlation coefficient. It is a measurement used to determine if two variables change in a proportional (linear) relationship in the same direction (positive r-value) or in opposite directions (negative r-value.) So a positive r-value means that both variables have a tendency to increase or decrease together in a proportional manner. A negative r-value means if one increases, the other decreases, and vice versa. Correlation r-values are always numbers trapped between negative one and positive one. A positive r-value "close to" positive one means that if you graphed the numerical values of the two variables (using one as an x-value and the other as a y-value), the data points would be almost a straight line with positive slope. A negative r-value "close to" negative one means the graph of data points would be almost a straight line with negative slope. An r-value that is "close to" zero means that the relationship between the two variables is not like a straight line at all. A p-value is determined to tell whether your r-value should be considered "close to" either positive or negative one. The p-value used with a correlation coefficient reflects that the standard of "close to" is much more forgiving if you are looking at 10,000 data points rather than 10 data points.

*Warning:* The correlation of two variables does not imply that one result "causes" the other one. It means they appear to be related, but there could be some hidden variables you don't know about that are actually causing the apparent relationship.