What is Partial Eta Squared? (Definition & Example)

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Partial Eta Squared is a statistical measure used to determine the effect size of a particular independent variable on a dependent variable. It is typically used in analysis of variance (ANOVA) to quantify the proportion of variation in the dependent variable that can be attributed to a specific independent variable, while controlling for other factors. It is expressed as a value between 0 and 1, with higher values indicating a larger effect size. For example, in a study examining the impact of different teaching strategies on student test scores, partial eta squared can be used to determine the relative effect of each teaching strategy on the overall test scores while accounting for other factors such as student ability or prior knowledge.

What is Partial Eta Squared? (Definition & Example)

Partial eta squared is a way to measure the of different variables in ANOVA models.

It measures the proportion of variance explained by a given variable of the total variance remaining after accounting for variance explained by other variables in the model.

How to Calculate Partial Eta Squared

The formula to calculate Partial eta squared is as follows:

Partial eta squared = SSeffect / (SSeffect + SSerror)

where:

SSeffect: The sum of squares of an effect for one variable.SSerror: The sum of squares error in the

ANOVA model.

The value for Partial eta squared ranges from 0 to 1, where values closer to 1 indicate a higher proportion of variance that can be explained by a given variable in the model after accounting for variance explained by other variables in the model.

The following rules of thumb are used to interpret values for Partial eta squared:

.01: Small effect size.06: Medium effect size.14 or higher: Large effect size

Example: Calculating Partial Eta Squared

Suppose we want to determine if exercise intensity and gender impact weight loss.

To test this, we recruit 30 men and 30 women to participate in an experiment in which we randomly assign 10 of each to follow a program of either no exercise, light exercise, or intense exercise for one month.

The following table shows the results of a using

exercise and gender as factors and weight loss as the :

Df Sum Sq Mean Sq F value p value
gender 1 15.8 15.80 9.916 0.00263
exercise 2 505.6 252.78 158.610 0.00000
Residuals 56 89.2 1.59

We can calculate the partial eta squared for gender and exercise as follows:

Partial eta squared for gender: 15.8 / (15.8+89.2) = .15044Partial eta squared for exercise: 505.6 / (505.6+89.2) = .85

These results match the p-values shown in the output of the ANOVA table. The p-value for exercise (0.00000) is much smaller than the p-value for gender (.00263), which indicates that exercise is much more significant at predicting weight loss.

Eta Squared vs. Partial Eta Squared

measures the proportion of variance that a given variable accounts for out of the total variance in an ANOVA model. It is calculated as:

Eta squared = SSeffect / SStotal

where:

SSeffect: The sum of squares of an effect for one variable.SStotal: The total sum of squares in the ANOVA model.

When there is only one predictor variable in the model (i.e. a one-way ANOVA), then the value for eta squared and partial eta squared will be equal.

By default, programs like SPSS report partial eta squared values in the output of ANOVA tables. Thus, it's important to know the subtle difference between eta squared and partial eta squared.