

What is the definition of partial eta squared?

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Partial eta squared is a measure of effect size used in the analysis of variance (ANOVA) that provides a measure of the proportion of variance in a dependent variable that is explained by a predictor variable. It is calculated as the ratio of the explained variance to the total variance, multiplied by 100. Partial eta squared is an improvement over eta squared because it takes into account the degrees of freedom, allowing for comparison of effect sizes between models with different numbers of predictors.

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:

$$\text{Partial eta squared} = \text{SSeffect} / (\text{SSeffect} + \text{SSerror})$$

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: $15.8 / (15.8 + 89.2) = .15044$

Partial 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 = $SS_{\text{effect}} / SS_{\text{total}}$

where:

SS_{effect} : The sum of squares of an effect for one variable.

SS_{total} : 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.