

## PROC GLM Effect Size Estimates

The EFFECTSIZE option in GLM was introduced in Version 6.2 of SAS. To learn about it pull up SAS Help and search for EFFECTSIZE. Find and read the document “Effect Size Measures for *F* Tests in GLM Experimental.”

EFFECTSIZE will give point estimates and conservative confidence intervals for the noncentrality parameter, eta-squared (SAS calls it ‘semipartial eta-squared’), omega-squared (SAS calls it ‘semipartial omega-squared’), partial eta-squared, and partial omega-squared. The omega-squared statistics are less biased than the eta-squared statistics. The conservative confidence interval is the same for eta-squared as for omega-squared, as both estimate the same parameter. For a one-way design the semipartial statistic is identical to the partial statistic.

Here is an example of the code necessary to produce these estimates and confidence intervals for a two-way ANOVA:

```
PROC GLM data=klw; CLASS Age Condition;
MODEL Items=Age|Condition / EFFECTSIZE alpha=0.1; run;
```

“Alpha=0.1” sets the confidence coefficient equal to 10%, which is appropriate if the alpha for the *F* test is .05.

### The Output

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2-WAY, EQUAL NS, INDEPENDENT SAMPLES ANOVA 1  
Howell, 7th edition, page 417

The GLM Procedure

Class Level Information

Class	Levels	Values
Age	2	Old Young
Condition	5	Adjective Counting Imagery Intentional Rhyming

Number of Observations Read 100  
Number of Observations Used 100

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2-WAY, EQUAL NS, INDEPENDENT SAMPLES ANOVA 2  
Howell, 7th edition, page 417

The GLM Procedure

Dependent Variable: Items

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	9	1945.490000	216.165556	26.93	<.0001
Error	90	722.300000	8.025556		

Corrected Total                    99        2667.790000

R-Square	Coeff Var	Root MSE	Items Mean
0.729252	24.40087	2.832941	11.61000

Overall Noncentrality

Min Var Unbiased Estimate	228.02
Low MSE Estimate	222.84
90% Confidence Limits	(161.9,317.85)

Proportion of Variation Accounted for

Eta-Square	0.73
Omega-Square	0.70
90% Confidence Limits	(0.62,0.76)

Source	DF	Type I SS	Mean Square	F Value	Pr > F
Age	1	240.250000	240.250000	29.94	<.0001
Condition	4	1514.940000	378.735000	47.19	<.0001
Age*Condition	4	190.300000	47.575000	5.93	0.0003

Noncentrality Parameter

Source	Min Var Unbiased Estimate	Low MSE Estimate	90% Confidence Limits	
Age	28.3	27.6	13.6	52.3
Condition	180.6	176.5	126.2	255.0
Age*Condition	19.2	18.7	7.2	40.2

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The GLM Procedure

Dependent Variable: Items

Total Variation Accounted For

Source	Semipartial		
	Semipartial Eta-Square	Omega-Square	Conservative 90% Confidence Limits
Age	0.0901	0.0868	0.0198 0.1867
Condition	0.5679	0.5542	0.4407 0.6335
Age*Condition	0.0713	0.0591	0.0000 0.1324

Partial Variation Accounted For

Source	Partial Eta-Square	Partial Omega- Square	90% Confidence Limits	
Age	0.2496	0.2244	0.1194	0.3435
Condition	0.6771	0.6488	0.5579	0.7183
Age*Condition	0.2085	0.1647	0.0671	0.2867

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