

# One-Way ANCOVA

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## Data Analysis Plan: One-Way ANCOVA

Copy and paste the following into a word document to use as your data analysis plan template.

*Research Question:*

After controlling for **covariate 1**, are there differences on **dependent variable** by **independent variable (group 1 vs. group 2)**?

$H_0$ : After controlling for **covariate 1**, there are no differences on **dependent variable** by **independent variable (group 1 vs. group 2)**.

$H_a$ : After controlling for **covariate 1**, there are differences on **dependent variable** by **independent variable (group 1 vs. group 2)**.

### *Data Analysis*

To investigate the research question, an Analysis of Covariance (one-way ANCOVA) will be conducted to assess differences between groups on a single dependent variable after controlling for the effects of one or more covariates. The one-way ANCOVA is used to test the main effects of categorical independent variable on a continuous dependent variable while controlling for the effect of other continuous variables which co-vary with the dependent. For this analysis, the dependent variable is **dependent variable**. The control variables are **covariate 1, covariate 2, ...**. The covariates are chosen specifically because of their known effects on the dependent variable. The purpose is to partial-out the effects of those variables on the dependent variable to determine if the effects are strictly due to the covariate or if the differences are

independent of the effects of that covariate. There is one independent variable with **two** levels (**group 1 vs. group 2**).

The  $F$ -test of significance will be used to assess the main and interaction effects.  $F$  is the between-groups variance (mean square) divided by the within-groups variance (mean square). When the  $F$  value is greater than 1, more variation occurs between groups than within groups. When this occurs, the computed  $p$ -value is small and a significant relationship exists. If significance is found, comparison of the original and adjusted group means can provide information about the role of the covariates. Because predictable variances known to be associated with the dependent variable are removed from the error term, ANCOVA increases the power of the  $F$  test for the main effect or interaction. Essentially, it removes the undesirable variance in the dependent variable. The assumptions of ANCOVA are similar to those of ANOVA. The dependent variable must be continuous/interval and normally distributed. This will be checked with skewness values. The relationship between the covariate and the dependent variable should be linear, which will be assessed by a scatterplot. There is homogeneity of variance, which will be assessed through the Levene's Test.

### ***Reference***

Statistics Solutions. (2013). Data analysis plan: One-Way ANCOVA [WWW Document]. Retrieved from <http://www.statisticssolutions.com/academic-solutions/member-resources/member-profile/data-analysis-plan-templates/data-plan-plan-one-way-ancova/>

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