

The Assumption of Homogeneity of Variance

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[The assumption of homogeneity of variance](#) is an assumption of the ANOVA that assumes that all groups have the same or similar variance. The [ANOVA](#) utilizes the F statistic, which is robust to the assumption, as long as group sizes are equal. Equal group sizes may be defined by the ratio of the largest to smallest group being less than 1.5. If group sizes are vastly unequal and homogeneity of variance is violated, then the F statistic is considered liberal when large sample variances are associated with small group sizes. When this occurs, the alpha value is greater than the level of significance. This indicates that the null hypothesis is being falsely rejected. On the other hand, the F statistic is considered too conservative if large variances are associated with large group sizes. This would mean that the actual alpha value is less than the level of significance. This does not cause the same problems as falsely rejecting the null hypothesis, however, it can cause a decrease in the power of the study.

To test for homogeneity of variance there are several statistical tests that can be used; these tests include: Hartley's F_{max} , Cochran's, Levene's and Barlett's test. Several of these assessments have been found to be too sensitive to non-normality and are not frequently used. Of these tests, a more common assessment for homogeneity of variance is [Levene's test](#). The test statistic for Levene's test is calculated by diverging the data for each group from the group mean, and then comparing the absolute values. Levene's test is presented with the F statistic, as an ANOVA is conducted to compare the absolute values. A p value less than .05 indicates a violation of the assumption. If a violation occurs, it is likely that conducting the non-parametric equivalent of the analysis is more appropriate.