

ANOVA

The One-Way ANOVA compares the mean of one or more groups based on one independent variables (or factor). We assume that the dependent variable is normally distributed and that groups have approximately equal variance on the dependent variable.

Null Hypothesis: There are no significant differences between groups' mean scores.

Alternate Hypothesis: There is a significant difference between groups' mean scores.

In this example, we compare “frequency of sex” by church attendance, recoded from 9 groups to 3 groups (0=not often, 1=sometimes, 2=often).

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. anova sexfreq church
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Number of obs = 2142 R-squared = 0.0132
Root MSE = 2.00297 Adj R-squared = 0.0122

| Source | Partial SS | df | MS | F | Prob > F |
|----------|------------|------|------------|-------|----------|
| Model | 114.423493 | 2 | 57.2117464 | 14.26 | 0.0000 |
| church | 114.423493 | 2 | 57.2117464 | 14.26 | 0.0000 |
| Residual | 8581.45139 | 2139 | 4.01189873 | | |
| Total | 8695.87488 | 2141 | 4.06159499 | | |

$$F = \frac{\text{variance between groups}}{\text{variance expected due to chance (error)}} = \frac{57.212}{4.012} = 14.26$$

If the sample means are clustered closely together (i.e., small differences), the variance will be small; if the means are spread out (i.e., large differences), the variances will be larger.

Our F value is 14.261. Our significance level is .000. We can conclude that there is a significant difference between the three groups. To determine which groups are different from one another, we use the “multiple comparisons” results below.