What We Will Cover in This Section

- Overview.
- How it works.
- Steps

Sample Problem

Ivanna Dayoff was doing research on the benefits of vacations on the mental health of working adults. Dayoff categorized people by the number of weeks vacation they had a year (0, 1, 2, 3, 4). She then evaluated the mental health of these participants using a standardized occupational stress index. Ivanna realized that the income of the participants could mask the relationship between vacation and stress.
Traditional ANOVA

Between Groups Variability
Within Groups Variability

Between Groups Variability
Random Variability + Subject Variability + Income Variability

Terms

- Covariate
  A variable that is correlated with the dependent variable.

- Partialing Out
  Statistical process of removing the variability associated with a covariate.

What Is/Are It?

Statistical technique of conducting an analysis of variance after the effects of one or more covariates have been partialed out.
Concept

Covariate

Independent
Variable

Dependent
Variable

When is it used?

1. Increase the sensitivity of the F-test to better evaluate the ‘pure’ influence of the independent variable.
2. Statistically adjust treatment groups when the assumption of random assignment has been violated.

Model

Between

Between

Within

Within
Selecting Covariates

- The covariate should be significantly correlated with the dependent variable.
- If more than one covariate, they should have low correlations with each other.

Number of Covariates

\[ \frac{C + (J - 1)}{N} < .10 \]

- \( C \) = Desired number of covariates.
- \( J \) = Number of treatment groups.
- \( N \) = Sample size.

![Graph showing the relationship between Income and Stress]
Statistical Steps

1. Statistically remove the variability attributed to the covariate
2. Conduct the ANOVA using the remaining variability.
3. Interpret the F as usual.
4. Interpret post hoc tests as usual.
5. Interpret $\eta^2$ as usual.

Assumptions

- Observations are random and independent.
- Distribution of the dependent variable scores are normal
- Equality of variance
- There is a linear relationship between the covariates and the dependent variable.
- The covariate is reliable.
- The slope of the regression lines are similar.

The End