

3.2: Between Versus Within Groups Analysis

Learning Objectives

At the end of this chapter you should be able to answer the following questions:

- What is the difference between a *Between Groups* test and a *Within Groups* test?
- What is a *Mean Difference* in the context of statistical analysis?

There are two main types of statistical tests: those that look at differences *Between Groups* and those that look at differences *Within Groups*.

Between Groups differences examine how independent groups – groups that are not the same – may differ from each other on a variable. Between Groups difference tests are useful for examining the efficacy of interventions or treatments. For example, if you wanted to see if a new form of anxiety therapy was effective, you could organise two groups of participants, and provide one with the new form of anxiety therapy. This group would be the intervention group. To use a *Between Groups* test you would also need a comparison group that does not receive the treatment, which would be your control group. Both groups would need to receive some form of outcome measure – such as a measure of anxiety taken after the treatment. You would then compare the two and see if there were any differences in mental states.

Within Groups differences are similarly important. For example, if a researcher wants to examine if an exercise program is effective, she could take the BMI of a group of test subjects at the start of the program and again at the end of the program and compare the two. In this case, the researcher is not looking at the differences between two groups, but rather the differences between the same group taken at two time points.

In both differences between groups and differences within groups, we will generally look at differences between means on some variable of interest. When we talk about a *Mean Difference*, we are talking about the difference between the mean of one group and the mean of another group in the case of differences between groups. In the case of differences within groups, we look at differences in means between two or more different points in time when measurements are taken. When looking at the BMI of the trial group we just mentioned, you would want the mean score of the group at pre-program, and the mean score at post-program.

To examine the differences between or within groups, you also need to know the standard deviations of both means you are comparing, as well as the number of participants. With the mean, the measure of variance within the samples is the standard deviation. Once you have the mean difference, the standard deviation, and the number of data points, you can then use the T-test to calculate if the difference between the two means is statistically significant.

There are two main types of t-tests we will be focusing on – the independent samples t-test and the paired samples t-test. When you are examining the difference between two groups, you want to use the independent samples t-test, however, if you are looking into the difference between the same group at two different time points, the paired-sample t-test is the one to use.

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