13.6: Choosing the Correct Analysis- Mean Comparison Edition

It's time to step back for a second and reflect on all that you've learned!

Even though this is a statistics course, you've actually learned a lot about research design. You've learned that participants can be different in the different groups or levels of the IV (independent or between groups designs), or they can be the same people or somehow linked together (dependent or repeated measures designs). You've learned that we can compare the means for one IV with two or more groups, or even statistically compare the means of more than one IV. It was sorta hidden, but we also talked about factorial designs that could have one IV that was independent and a second IV that is dependent; this is called a mixed designed.

We've almost exclusively focused on DVs that are means (quantitative variables), but sometimes mentioned ranked DVs (ordinal variables) when discussing non-parametric analyses.

Knowing the design of the IVs and DV determines what kind of statistical analysis that you use. So far, we've covered several ways to compare the mean of groups:

- One-sample t-test
- Independent t-test
- Dependent t-test
- Between Groups ANOVA
- Repeated Measures ANOVA

And these compare the ranks of groups:

- Mann-Whitney U
- Wilcoxon Match-Pair Signed-Rank test
- Kruskal-Wallis H
- Friedman's test

So when would you use which one? It depends! It depends on:

- The type of DV (qualitative or quantitative or ranked/ordinal)
- The number of groups
- Whether the groups are independent or dependent or the population

This Decision Tree handout is a great resource for making that decision. I encourage you to save this document for your future classes. You can use it now to go through the analyses that we've learned so far to see why we use them when we use them. Pay attention to the names, they tell you a lot about why they are used when they are used.

Example 13.6.1

Identify the type of DV, number of groups, and type of groups for the analyses that we've learned so far:

- One-sample t-test
- Independent t-test
- Dependent t-test
- Between Groups ANOVA
- Repeated Measures ANOVA
- Mann-Whitney U
- Wilcoxon Match-Pair Signed-Rank test
- Kruskal-Wallis H
- Friedman's test

Solution

- One-Sample t-test
  - The type of DV: Compares means, so quantitative
  - The number of groups: Compares a sample to the population
  - Whether the groups are independent or dependent or the population: The population
- Two-sample independent t-test

- The type of DV: Compares means, so quantitative
  - The number of groups: Compares two samples
  - Whether the groups are independent or dependent or the population: Independent (unrelated)
- Two-sample dependent t-test
  - The type of DV: Compares means, so quantitative
  - The number of groups: Compares two samples
  - Whether the groups are independent or dependent or the population: Dependent (related)
- Between Groups ANOVA
  - The type of DV: Compares means, so quantitative
  - The number of groups: Compares two or more levels of an IV
  - Whether the groups are independent or dependent or the population: Independent (unrelated)
- Repeated Measures ANOVA (also called Within Groups ANOVA)
  - The type of DV: Compares means, so quantitative
  - The number of groups: Compares two or more levels of an IV
  - Whether the groups are independent or dependent or the population: Dependent (related)
- Mann-Whitney U
  - The type of DV: Ranked data, or we assume that the distribution is NOT normally distributed.
  - The number of groups: Compares two groups
  - Whether the groups are independent or dependent or the population: Independent (unrelated)
- Wilcoxon Match-Pair Signed-Rank test
  - The type of DV: Ranked data, or we assume that the distribution is NOT normally distributed.
  - The number of groups: Compares two groups
  - Whether the groups are independent or dependent or the population: Dependent (related)
- Kruskal-Wallis One-Way ANOVA
  - The type of DV: Ranked data, or we assume that the distribution is NOT normally distributed.
  - The number of groups: Compares two or more groups
  - Whether the groups are independent or dependent or the population: Independent (unrelated)
- Friedman's test
  - The type of DV: Ranked data, or we assume that the distribution is NOT normally distributed.
  - The number of groups: Compares two or more groups
  - Whether the groups are independent or dependent or the population: Dependent (related)

You might notice that all these have quantitative (or ranked) DVs with two or more groups. That's what this unit is about! In the next set of chapters, we'll learn about the appropriate analyses when the DVs aren't means.

Because this is an introductory textbook, we leave out a full discussion other analyses of means, and particularly of mixed designs. In this chapter, in particular, we are leaving out are the formulas to construct the Sum of Squares for each effect. There are many good more advanced textbooks that discuss these issues in much more depth. And, these things can all be found online.

Here's an interactive website to help you practice when to use which kind of statistical analysis. To start, click on the kinds of analyses that you are familiar with, then hit Submit.

Contributors and Attributions

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