Module 8.5: Review of Procedures Covered to this Point

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Introduction to Statistics for the Social Sciences

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Simple Z Test (i.e. w/Sample of 1).

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- Research question: Did this score come from this known population?

Research Design: Simple Z Test

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- Simple Z test is more than a *descriptive* but less than an *inferential* test.
  - Simply identifying a single score in a population distribution.
- Not really making an inference **about** a population.
- Just making a decision about a score's placement in a known population.
  - Known μ and σ

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The Z Test with a Sample > 1.

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The Z Test with a Sample > 1.

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- Known: μ and σ
- Research question: Is this sample significantly different from the known population?
- Or: Did this sample come from the known population, or a different population?

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Research Design: Z test (Sample $>$ 1).

- No IV but there is a DV (the sample scores).
- But, the Z test with a sample mean *is* an inferential procedure.
- Using a sample ($n > 1$) to make an inference about population membership.
- The sample is *representative* of **a** population; we are attempting to determine if it belongs to the **known** population.
  - Known μ and σ

One Sample *t* Test

Used to evaluate the probability of a sample mean being as extreme or more extreme than the mean associated with our cutoff (typically 0.05) on the distribution of means (*t* distribution).

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- Research question: Is this sample significantly different from the known population?
- Or: Did this sample come from the known population or from a different population?

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Research Design: One Sample *t* Test

- No IV but there is a DV.
- But, the one sample *t* test is an inferential procedure.
- Using a sample ($n > 1$) to make an inference about population membership.
- The sample is *representative* of **a** population; we are attempting to determine if it belongs to the *partly* **known** population.
  - Known μ
  - Unknown σ (This is why *t* instead of Z.)

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Dependent Samples *t* Test

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- Unknown: μ_D (assume = 0) and Unknown σ_D
- Research question: Are these two samples significantly different from one another (i.e. did the treatment have an effect)?

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- Research question: Are these two samples significantly different from one another (i.e. did the treatment have an effect)?
- Or: Did this sample of difference scores come from different population of difference scores?

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Research Design: Dependent Samples *t* Test

- 1 IV (a treatment applied to all participants)

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Research Design: Dependent Samples *t* Test

- 1 IV (a treatment applied to all participants)
- 1 DV (an interval or ratio scaled variable to measure the difference)
- The Dependent Samples *t* Test is an inferential procedure.
- Using a sample ($n > 1$) of difference scores to make an inference about population difference score membership.
- The sample of difference scores are *representative* of a population; we are attempting to determine if the sample belongs to the **unknown** population.
  - Unknown μ (assumed to be 0)
  - Unknown σ

Independent Samples t Test

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- Unknown μ_1 σ_1 μ_2 σ_2
- Research question: Are these two samples significantly different from one another?
- Or: Did these two samples come from different populations?

Research Design: Independent Samples *t* Test

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- The Independent Samples *t* Test is an inferential procedure.
- Using two independent samples (each representative of a population) to make an inference about the effectiveness of an intervention (aka. experimental manipulation). Or, using the data from the two samples to determine if they came from the same population.
  - Unknown μ_1 μ_2
  - Unknown σ_1 σ_2

Looking to ANOVA

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- **Good News:** As we move into ANOVA; no longer have to deal with all the *wonderful* intermediate steps of NHST (i.e. steps 2a, 2b, 2c, etc.). We simply use a couple of new 'twists' on degrees of freedom to determine our cutoff sample score on the comparison distribution (*F* distribution). But...step 4 (calculate the statistic) is complex.

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- **Bad News:** The ANOVA grows from slightly more complex than the t test (1 or 2 groups) to extremely complex (> 2 groups). The ANOVA family of analyses begins with three groups and can accommodate any number of groups greater than 2.

One-way ANOVA

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- Unknown: σ_1 σ_2 σ_3 σ_4 ....σ_n
- Research question: Are these > 2 samples significantly different from each other?
- Or: Did these > 2 samples come from different populations?

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- 1 DV (an interval or ratio scaled variable to measure differences between the groups).
- ANOVA is one of the most popular inferential analysis.
- Using $>$ 2 independent samples (each representative of a population) to make an inference about the effectiveness of an intervention (aka. experimental manipulation). Or, using the data from $>$ 2 samples to determine if they came from the same population (or at least one from a different population).
  - Unknown μ_1 μ_2 μ_3 μ_4 .... μ_n
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