**Module V: One-way Between Groups ANOVA**

•Why an F-test?

•Review tests and when to use them

**Hypothesis Test Choices**

•Z-scores (procedure)

• Individual scores compared to overall pop.

•Single-sample z-tests

• Sample compared to overall pop.

• Have both a pop. mean and standard dev.

•Single-sample t-tests

• Sample compared to overall pop.

• Have only a pop. mean

**Hypothesis Test Choices**

•Paired-sample t-tests

• Sample compared to another sample

• Samples are dependent on each other (paired; within-groups design)

• No population parameters

**Hypothesis Test Choices**

•Independent-sample t-tests

• Sample compared to another sample

• Samples are independent of each other (between-groups design)

• No population parameters

**Why an F-test?**

•We have more than two groups

•t and z-distributions can only compare the differences between two populations

•Could do multiple t-tests…

**Multiple t-tests inflates alpha**

•Alpha inflation is C(α)

•C is the number of comparisons (t-tests)

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•C is the number of comparisons (t-tests)

•Ex. if there were 3 groups (compare 2 at a time)

•Group X vs. Group Y

•Group X vs. Group Z

•Group Y vs. Group Z

•Alpha (Type I error rate) is 3(0.05) = 0.15

**Multiple t-tests inflates alpha**

•Alpha inflation is C(α)

•C is the number of comparisons (t-tests)

•Bonferroni adjustment

•α/C

•Ex. 3 comparisons: 0.05/3 = 0.017 for each comparison

•This creates overly conservative tests

•Better to test comparisons simultaneously

**•Why an F-test?**

•Relationship to t and z-distributions

**Use F-test to compare more than two groups**

•One-way between groups ANOVA

•One-way within groups ANOVA

**One-way between groups ANOVA**

•Ex. Drug condition (none, placebo, new drug) on pain experienced

**F-test assumptions for between-groups ANOVA**

• Dependent variable is scale

• Participants are randomly selected

• Populations are normally distributed

• Population diff. b/t means is 0 (μMdiff = 0)

• Participants experience one and only one IV condition

**Population means based on null (μ Mdiff = 0)**

• Ex. Type of drug (none, placebo, new drug) on pain relief

• H0: No difference in pain between drug conditions; (k [k-1])/2 = number of

comparisons

• None vs. placebo

• None vs. new drug

• Placebo vs. new drug

**What is needed for an F-test?**

•Variance between groups (MSbetween)

•Variance within groups (MSwithin)

**Analysis of variance (ANOVA) because**

•Order of subtraction matters

•Ex. Mnone = 7, Mplacebo = 5, Mnew drug = 3

• 7 – 5 – 3 = -1

• 3 – 5 – 7 = -9

• 5 – 3 – 7 = -5