This session is being recorded and will be available for viewing on our website.

http://academicguides.waldenu.edu/ASC/skillbuilder
Housekeeping items....

- Please use the chat box to ask questions that will be answered by the moderator or by the host at the end of our session.

- Closed captioning is available.

- No need to use the “Raise Hand” feature. Address questions in the chat area for response.

- For questions after the session on from the archived session, please contact ASCTutoring@Waldenu.edu

- Links presented in this session are interactive.

- This presentation will be available within 48 hours on our website: http://academicguides.waldenu.edu/ASC/skillbuilder.
Agenda

• Review of previous sessions
• T tests
• ANOVA
• Questions
• Additional Resources
Previous skill builders

• General concepts
  – Normal distribution
  – Variance
  – Null and alternative hypothesis

• Descriptive statistics
  – Means
  – Variation
My commute time

- Average commute time is: 75 minutes
- Most of the time it takes between 60 and 90 minutes.
Assumptions

• Normal distribution
• Equal variance
• Samples are independent of one another
Defining variables

• Independent variable – predictor
  – Must be a grouping variable
• Dependent variable – outcome
  – Must be a continuous variable
Hypothesis testing

- Null hypothesis – no difference
- Alternative hypothesis - difference
Significance

• What is the probability that the variation in the sample can be attributed to chance?
• May be expressed as a p-value, or as confidence intervals
• Significance is usually set at .05 (5%), but this depends on the type of research (can be more or less).
Comparing means

Commute times during rush hour
Comparing means

Morning commute vs. evening commute

- Morning commute: 60, 75, 80, 90
- Evening commute: 100, 120
T Tests

- One sample
- Independent samples
- Paired
t-Tests

- The t-test is used to compare two groups
- It uses the mean of a specified variable to compare the groups
- To have a mean, the variable must be at least approximately normal; therefore categorical variables, whether nominal or ordinal cannot be compared using the t-test
- The t-test can only compare two groups so when your research question requires the comparison of more than two groups the t-test is not the correct test to use
- The t-statistic is used to estimate the magnitude of the difference between your two groups, the larger the t-statistic the bigger the difference between the groups, the more significant the results, and the easier it is to reject the null hypothesis that the two groups are the same
Demonstration

- SPSS
- Excel
Types of ANOVA

- One way
- Two way
- Repeated measures
- ANCOVA
- MANOVA
Comparing means

Normal: blue
Raining: red
Snowing: green
Analysis of Variance (ANOVA)

Independent Variable
- The independent variable is at the nominal level
- There can be one independent variable or factor (One-Way ANOVA), two independent variables (Two-Way ANOVA), or more than two independent variables (n-Way ANOVA)
- Each independent variable has two or more levels (such as gender which has male and female)

Dependent Variable
- Continuous (at least interval)
- Normally distributed

Assumptions
- Same as for t-test
- Mutually exclusive groups or factors for independent variable
- Groups also have equal variances (homogeneity of variance)
Running an ANOVA

- Tests of homogeneity of variance
- Post hoc tests
Demonstration

• SPSS
• Excel
  – Analysis tool pak
ANOVA vs. t-Test

**Similarities**
- Both compare means of different groups
- Both are based on a null hypothesis that the group means are the same
- Both require that the dependent variable is continuous and normally distributed

**Differences**
- The t-test compares just two means using the null hypothesis:
  \[ H_0 = \mu_1 = \mu_2 \]
- ANOVA compares three or more means using the null hypothesis:
  \[ H_0 = \mu_1 = \mu_2 = \mu_3 = \mu_n \]
- The resulting statistic from the t-test is the t-statistic while from ANOVA it is the F-statistic
Questions
Contact Us

- E-mail us: ASCTutoring@Waldenu.edu
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• The ASC offers workshops for doctoral students who have working drafts of their proposals and want writing assistance revising and editing those drafts.

• We have workshops on the following topics:
  – Overall proposal
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  – Methods Section

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