One-way ANVOA

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| Question | Answer |
| 1. 1. What is your name? | Jacqueline Kent-Marvick |
| When conducting statistical analyses, we should  always keep in mind the larger context in which  we are working with data. What are steps in the  research process which are completed before we  analyze data? (Hint: This was on the week 1 assignment.) | 1. Generate research questions 2. Generate research hypotheses 3. Determine study design, variables, levels of measurement 4. Collect data |
| Data needs to be examined and any problems fixed  before analyses can be done. In statistics, what are  4 main areas to examine as part of pre-analysis checking?  (Hint: This was on the week 2 assignment.) | 1. a. Data accuracy 2. b. Missing data 3. c. Outliers 4. d. Statistical assumptions |
| What are important steps to complete when checking  data accuracy? (Hint: This was on the week 2 assignment.) | a. Make sure the data types are correct.   1. What is measurement of each variable?   b. Check the data for typos.   1. i.e. mailes for males, feemales for females   c. Check the data for nonsensical values.   1. i.e. 1000 year old people, BMI of 500   d. Check categories make sense.   1. i.e. variable is gender but has a category of blue   e. Correct problems if possible or omit the data from the analyses.   1. Use filtering to select the desired data and leave out the data not desired   f. Reverse code instrument items if needed.   1. Make sure to do needed recoding before calculating summary scores.   g. Calculate summary scores for any instruments that need it.   1. Make sure to use instrument scoring methods recommended by the instrument developer.   h. Keep track of what you do so you can report it as part of the analysis steps you completed. (Be transparent. completed.   1. Make notes as you complete analysis steps. Keep the code you used with the output. |
| Add needed modules to Jamovi. | We're going to use some of the Jamovi modules. We need to install them first if they're not already installed.  Click on the Jamovi Modules icon on the right-hand side of the Jamovi window.  (It looks like a large plus (+) sign in the current version.) Install the following modules:   1. a. Statkat – Method selection tool 2. b. moretests 3. c. Jsq – Bayesian Methods 4. d. Walrus |
| 6. Open the Puppies.sav dataset in Jamovi.  (Note any difficulties.) | a. A note about the Puppies.sav dataset. I love Field’s explanation of ANOVA. But I don’t care much for this dataset for this example.  I personally would classify the Happiness variable as ordinal level of measurement which is not really appropriate for the dependent variable in ANOVA.  Go ahead and use Happiness as a continuous variable for purpose of this assignment, but if you ever see a rating variable like this with only 10 levels  somewhere else in this class, I would call it ordinal. |
| 7. What are the variables in the dataset and the  level of measurement for each one? Make sure the level  of measurement for each variable is correct in Jamovi.  \* The Happiness variable is an example of the gray area  sometimes encountered between ordinal level of  measurement and interval level of measurement.  I would normally call a 10-point scale ordinal level of  measurement. Field went ahead and used this as a  continuous variable for an ANOVA example.  I would not have done that. To work this example in  Jamovi, you’ll need to label Happiness as a continuous  variable. | Person: Jamovi listed this as continuous. I changed it to nominal;  Dose: ordinal;  Happiness: (would normally be ordinal) we are going to use Happiness as continuous |
| 8. Check the dataset for accuracy using visual  inspection, descriptive statistics, and plots.  Note any problems. What descriptive statistics and plots  should be used for each variable?  (Treat Happiness as a continuous variable.) | For Person and Dose, we can use bar plots, frequencies and percent  For Happiness, we will use histogram, box plot, m(sd) and st |
| 9. How can you get descriptive statistics for each  group separately in Jamovi? | Jamovi - Analyses - Exploration - Descriptives - enter a categorical variable into the Split by box |
| 10. Choose the correct statistical test.  One of the challenges of conducting a statistical analysis  is choosing the correct test to perform. Jamovi provides  some help knowing what statistical analyses are possible  given your data. Try it out. Jamovi – Analysis – Statkat –  Relationships, Prediction, and Group Comparison.  Put a categorical variable in the Independent Variables box.  Put a continuous variable in the Dependent Variables box. | a. What test does Statkat in Jamovi recommend? One-way ANOVA |
| 11. NHST steps. Different statistical texts list  the steps for NHST slightly differently.  But most contain some variation of the following steps  (Hint – This was discussed in the week 5 assignment.): | a. State the null and alternative hypotheses.  b. Set the criterion for rejections (alpha level).  c. Calculate the test statistic.  d. Draw conclusion about the null hypothesis.  e. Report the results. |
| 12. What are the assumptions for a one-way  ANOVA? Does our data meet those assumptions? | Homogeneity of variance; Observations are independent; Sampling distribution normally distributed within groups |
| 13. What are the null and alternative hypotheses  for the one-way ANOVA? | a. H\_0 (null): The null hypothesis for an ANOVA is that there is no difference in group means  b. H\_1 (alternative): The alternative hypothesis for an ANOVA is that group means differ |
| 14. What is the criteria for rejection?  There are situations where you may want to use a different  alpha level than alpha = .05.  If you're doing pilot studies you're mostly looking for  trends and possibilities. The alpha level may be relaxed  to alpha = .10. If you're doing something like drug studies  where there could be negative consequences for false  positives the alpha level may be reduced to alpha = .01.  We're going to stick to alpha = .05 for class exercises. | a. alpha = 0.05 |
| 15. Jamovi offers a couple different ways to  conduct a one-way ANOVA.  1) Analysis – ANOVA – One-way ANOVA  2) Analysis – ANOVA – ANOVA  \* Field 12.3.1 and Navarro & Foxcroft 13.6  explain some of the differences. | a. What does Analysis – ANOVA – One-way ANOVA offer that is only  available for a one-way ANOVA? I see Welch’s and df1 and df2  b. What does Analysis – ANOVA – ANOVA offer that is not available in the  other menu? I see sum of squares and mean square that looks different. It could be Omega.  c. What does Welch’s correction compensate for? Page 396: Degrees of homogeneity  d. What does Welch’s correction change to adjust the value for F? Residual degrees of freedom |
| 16. What effect size for ANOVA does Field 12.10  and Navarro & Foxcroft 13.4 recommend for ANOVA? | Eta squared? |
| 17. Calculate the one-way ANOVA to compare  mean happiness between the dose groups.  Jamovi - Analyses - ANOVA – ANOVA.  \* Move Happiness to the Dependent Variables box.  \* Move Dose to the Grouping variable box.  \* Check omega under effect size.  \* Check everything under Assumption checks  \* Check Tukey and Cohen’s d under Post-hoc tests. | a. Look at the Reporting one-way ANOVA section in Field 12.11  b. What information did Field include in the section reporting the results for the  one-way ANOVA? Because the degrees of freedom are listed, he wants us to  always report the Browne-Forsythe or Welch’s F.  c. F = 5.12  d. degrees of freedom Dose = 2  e. degrees of freedom Residuals = 12  f. p = 0.025  g. effect size omega squared = 0.460  h. Which groups had a significant difference between means in post-hoc tests?  Control – 30 minutes?  i. Which group had the highest happiness? |
| 1. 18. Levene’s test | a. Was Levene’s test significant? No  b. Did we pass the homogeneity of variance assumption? Yes |
| 19. What is your decision about the null hypothesis?   \* Do you reject or fail to reject the null? | Reject the null |
| 20. Try a robust ANOVA  \* Walrus - Robust ANOVA  \* Check trim and post-hoc tests | a. Compare the results in Jamovi with the output in Field 12.8.  It seems the method implemented in Jamovi and the one used by Field differ.  The results differ by quite a bit. |
| 21. If we don't have a problem with any assumptions  then we would run and interpret Analysis –  ANOVA – ANOVA .  \* Field 12.3.3 and Navarro & Foxcroft 13.6 – 13.7  discuss problems with assumptions.  If we have problems with the normality assumption or  outliers then we could run the non-parametric  Kruskal-Wallis test.  \* If we have problems with the homogeneity of variance  assumption (Levene's test) we can run Welch's or robust  ANOVA. | 1. a. |
| 22. Run the code in the included R markdown  (.Rmd). | a. Compare the output from the lm() function in R with the output from the linReg() function in the jmv package and the output in Jamovi.  Do the values match?  b. What values does Jamovi provide that you need to calculate separately in the lm() function?  c. Jamovi makes doing linear regression with categorical variables pretty easy.  Here’s a nice post <https://mattchoward.com/dummy-coded-regression-in-jamovi/> |
| 23. Save your Jamovi (.omv) file. You will turn it in. |  |
| 24. After you finished reading through the  .Rmd file. Knit the file to markdown and save the .md  file. You will turn the file in as part of your  assignment. Describe any difficulties. If you encounter  errors close all instances of RStudio and try opening it  again. (Don’t save your workspace.) If you encounter  errors while creating the file and can’t figure out how  to fix them before the assignment is due.  You can paste the text of the .Rmd file with the output  into a Word or pdf file and turn in that. |  |
| 25. What did you like/dislike  about this assignment? |  |
| 26. How would you change  this assignment to make it  better for future students? |  |
| 27. Complete the answer  submission in Canvas and turn in your RStudio and  Jamovi files.  (The answer submission in  Canvas allows multiple attempts. You may want to  save the text you provide in  open responses like the two  questions above so you can just  paste it into the answer field  if you make additional attempts  to improve your score.) |  |