

## PSYC 5301: Research Methods

Tarleton State University

Unit 3 Homework

1. Davey et al. (2003) were interested in the role of mood on the degree of compulsive checking in which a person engaged. Three groups of  $N = 10$  participants each listened to music designed to induce positive, negative, or neutral mood. They were then asked to “list as many things around your home that you should check for safety or security reasons before you go away for three weeks.” The dependent variable was the number of things listed. The data follow:

Positive mood	9	12	7	3	10	4	5	4	7	9
Negative mood	7	5	16	13	13	24	20	10	11	7
Neutral mood	8	5	11	9	11	10	11	10	7	5

- (a) Write precise definitions for a null hypothesis  $\mathcal{H}_0$  and alternative hypothesis  $\mathcal{H}_1$  for this scenario.
  - (b) Calculate the  $F$  statistic for an ANOVA comparing the means of the three groups.
  - (c) Calculate and interpret the  $p$ -value and Bayes factor associated with your obtained  $F$  statistic. Which model ( $\mathcal{H}_0$  or  $\mathcal{H}_1$ ) receives the most support from the data? Explain.
  - (d) Compute a 95% confidence interval for each of the group means.
2. Consider the following data from Eysenck (1974). Younger and older subjects were compared on their ability to recall material when given instructions telling them that they would be asked to memorize the material for later recall. The dependent variable is the number of items recalled:

Younger	21	19	17	15	22	16	22	22	18	21
Older	10	19	14	5	10	11	14	15	11	11

- (a) Compute an  $F$  statistic for an ANOVA comparing the two group means.
  - (b) Compute a  $t$  statistic for an independent samples  $t$ -test comparing the two group means.
  - (c) Can you discover a relationship between  $t$  and  $F$ ? What is it?
3. Sometimes it is necessary to perform supplementary analyses to those reported in published research papers. Suppose a journal article reports means of 3 for a control group, and 7,9,11 for three experimental groups, each with  $N = 8$ . The article reports  $F(3, 28) = 8.00$ , so the author concludes that the data show real differences. You wish to test differences among the three experimental groups (excluding the control group).
    - (a) Show that  $MS_{\text{within}} = 11.667$ .
    - (b) Perform an ANOVA comparing the means of the *three experimental groups*.
    - (c) Compute a 95% confidence interval for each single mean in the three experimental groups.
    - (d) Discuss how your results compare to the originally reported results.
  4. Suppose three group means are 3, 5, and 7, with a total of  $N = 30$  subjects. Suppose further that the within-groups variance is 9.
    - (a) Compute  $F$ , assuming that there are 10 subjects in each group.
    - (b) Compute  $F$ , assuming instead that the subjects are divided 3, 10, and 17 for the three groups in the given order.
    - (c) What broader lesson does this exercise suggest?