

PSYC 5301: Research Methods

Tarleton State University

Homework 6

Note: the data files for problems 2, 3, and 4 below are available on Canvas in the file hw6data.zip. When you download the file, you should be able to “unzip” the file into a directory which contains 3 separate CSV files.

1. Consider the following ANCOVA situation: you have a dependent variable Y which represents the posttest of an achievement test, and a covariate X , which represents the pretest of the same test. The data are below:

Group	X	Y
1	40	120
	50	125
	60	130
2	70	140
	75	150
	80	160
3	90	160
	100	175
	110	190

- (a) Calculate the posttest group means \bar{Y}_j for $j = 1, 2, 3$.
 - (b) Assuming that $\beta = 1$, calculate the adjusted posttest group means \bar{Y}'_j for $j = 1, 2, 3$.
 - (c) What effects (if any) did the covariate adjustment have on the overall results? Explain.
2. An education researcher wants to determine whether children whose preschool classroom has a window differ in their vocabulary acquisition as compared to children whose classroom does not have a window. At the beginning of the school year, 10 children were randomly assigned to one of two different classrooms: Classroom 1, which had a window, and Classroom 2, which had no window. All children were given a standardized vocabulary test as a pretest. At the end of the school year, each child's vocabulary was tested again.
 - (a) Perform an ANOVA testing whether there are significant differences in posttest vocabulary scores between the two classroom types. Report the results of your test along with the group means.
 - (b) Perform an ANCOVA to include the effect of pretest. Report the results of your test along with the adjusted group means.
 3. Psychologists have investigated under what conditions recalling negative emotions can be helpful as opposed to harmful. One hundred fifty-five subjects were asked to recall an interpersonal experience in which they felt overwhelming anger and hostility, and were randomly assigned to one of four conditions instructing them to adopt a perspective combining a type of self-perspective (self-immersed vs. self-distanced) and type of emotional focus (what vs. why). In the self-immersed perspective, subjects were told to “relive the situation as if it were happening to you all over again,” whereas in the self-distanced perspective they were to move away from their experience and watch it unfold from a distance. Subjects were to then focus on either the specific feelings they were experiencing (*what* focus) or on the reasons underlying their feelings (*why* focus). The dependent variable was a measure of implicit anger, a performance measure indexed by how many of seven target word fragments were completed as anger

words rather than neutral words. Subjects also rated their emotional closeness to the other person in their experience on a 7-point scale. The investigators treated this as a single-factor design with four treatment groups: Group 1 = immersed/what; Group 2 = immersed/why; Group 3 = distanced/what; Group 4 = distanced/why.

- (a) Perform an ANOVA testing whether there are significant differences in anger scores among the four treatment groups. Report the results of your test along with the group means.
 - (b) Perform an ANCOVA to include the effect of emotional closeness. Report the results of your test along with the adjusted group means.
4. Suppose 30 depressive individuals have been randomly assigned to one of three conditions: (1) selective serotonin reuptake inhibitor (SSRI) antidepressant medication, (2) placebo, or (3) wait list control. The Beck Depression Inventory (BDI) has been administered to each individual prior to the study, and then later is administered a second time at the end of the study.
 - (a) Because the groups were randomly assigned, it might seem acceptable to simply ignore pretest scores and just compare the three different groups' BDI scores at posttest. Test to see whether there is a significant difference between groups on the pretest. Why would this be an important test to conduct?
 - (b) Use an ANOVA to test for differences between the three groups on the *posttest* scores. Report the results of your test along with the group means.
 - (c) Perform an ANCOVA to include the effect of pretest scores in your model from part (b). Report the results of your test along with covariate adjusted means.
 - (d) Some people argue that ANCOVA always exaggerates differences between group means. Is that the case here? If not, what is the ANCOVA doing?