Practical Assignment III

Analysis of Variance

Quinton Quagliano, M.S., C.S.P

Department of Educational Psychology

Table of Contents

1 Pre-assignment Reminders

- Prior to attempting this homework, I strongly recommend that you have completed all other work through module 10, including:
    - Likely the most useful resource will be the video I specifically record for this assignment (near the assignment portal on Canvas)
    - Having watched all lectures thoroughly and taken notes (optionally with the guided notes)
    - Reading all assigned sections of the book, and completing practice examples as helpful and useful
    - Completing relevant lecture check-ins, and using answer key for review
    - Completing all quizzes, and reviewing correct answers at the end of the week

- This practical assignment will be graded for accuracy, please give yourself enough time to complete your best work
    - You may use your notes, book, SPSS software, provided data, and lectures to aid you in completing this
    - Where possible, include more detail to ensure you fully explain your rationale for a question
    - You should include ALL relevant SPSS output to support your work, please make clear where in the output you get your answers from

- This practical assignment is cumulative to the modules and practical assignment(s) prior, please review your previous work and notes to help you accomplish this work

- All syllabus and university policies on academic integrity, plagiarism, and other forms of misconduct apply to this assignment. Please review them if you are unfamiliar

2 Context

The following information will be useful for answer some questions on the homework, please ensure you read and understand the following context

You've been recruited by a large-scale standardized testing company to help in conducting analyses on an in-development standardized test. The eventual goal is for this test to be administered statewide in high schools, but right now, it is just in a preliminary phase. It has currently been administered only at two schools at two times points, and initial data has been gathered upon it.

The two high schools it has been administered at are VGSU and SBU. The test produces three index (composite) scores, which can be treated as continuous, ratio-scale data for the purpose of this assignment: A reading score, a math score, and a validity score. The reading and math score can be added together to get a total index score. In total, there are math, reading, and validity scores available for times points 1 and 2.

Your goal is to use your skills in SPSS to help accomplish some of the preliminary analyses as part of this study. The company would like to know if there are any oddities in the current data.

Based upon your prior knowledege, you make three hypotheses:
1. H_1: On average, students at SBU will have a significantly greater mean total index scores than students at VGSU at time 1
2. H_2: On average, students will have a reading index score significantly higher than 80 at time 1
3. H_3: On average, students will have improved significantly on math index score from time 1 to time 2

Please use the provided dataset on Canvas, standard_test_scores.sav, to complete this assignment.

3   Instructions

*Please double-check you have provided all necessary detail to **every** question below.*

3.1   Knowledge Checks (6 pts)

1. Rewrite all 3 hypotheses from the Context in a notation format, and include their respective null hypotheses, for a total of 3 pairs of alternative and null hypotheses (3 pts)

2. Identify each of the hypotheses as either right-tailed, left-tailed, or two-tailed and why (3 pts)

3.2   SPSS Applied Work (14 pts)

For each of the following questions, please provide any and all relevant SPSS output (or syntax when indicated). Follow the directions IN ORDER

Some questions may be review from previous practical assignments - consider re-watching the old walkthrough videos if necessary.

3. Create a new variable called "Invalid" that is 1 if the validity score **at time 1** is less than 50, and 0 if the validity score is greater than or equal to 50. Show the syntax for this process. (1 pt)

4. Filter by the new variable you just created, so that those who have a 1 for "Invalid" are filtered out. Show the syntax for this process. (1 pt)

5. Create a new variable called "Total[Time Point Number]" that is the sum of the math and reading index scores for each person, **for both time points**. Show the syntax for this process (1 pt).

At this step, you should have the following variables: Val1, Val2, Invalid, Reading1, Reading2, Math1, Math2, Total1, Total2, and School. Make sure you have these before proceeding.

6. Create the following descriptive statistics for the math, reading, and total index scores **grouped by** the school of the students **at time 1** : n (size), mean, median, standard, deviation, variance, minimum, maximum, IQR. Show the table output from SPSS. (1 pt)

7. Create the following plots for the math, reading, and total index scores **grouped by** the school of the students **at time 1** : histograms with normal (bell) curves overlaid and boxplots. Show the plot outputs from SPSS (1 pt)

8. Create a bar plot and frequency table for the school. Show the table AND plot output from SPSS (1 pt)

9. Conduct a Welch's independent samples t-test with the total index score **at time 1** for the hypothesis 1, which shows, at a minimum, the p-value and t-statistic. Show table output from SPSS. (2 pts)

10. Conduct a one-sample t-test with the reading index scores **at time 1** for hypothesis 2, which shows, at a minimum the p-value and t-statistic. Show table output from SPSS. (2 pts)

11. Conduct a paired-sample t-test with the math index score for hypothesis 3, which shows, at a minimum the p-value and t-statistic. Show table output from SPSS. (2 pts)

12. Choose whether to reject or retain the null hypothesis for each of the three original hypotheses, and explain why (2 pts)