Section 3.14 Hypothesis Test for a Continuous Outcome

1. mod3_14

1.1 Hypothesis Test for a Continuous Outcome

Notes:

Now it is time to conduct a hypothesis test for a continuous outcome with a matched design, such as pre-test and post-test.
1.2 Learning Outcomes

Notes:

1. Here are the module learning objectives.
2. Remember, the course evaluation you get to fill out will ask whether the learning objectives were appropriately covered and presented.
1.3 One Sample Matched – Continuous Outcome

Notes:

1. Here are the general steps involved in hypothesis testing for a continuous outcome with a matched design.
2. The focus is on the difference scores for each subject, such as before and after starting treatment with a medication.
3. Depending on the sample size, either the $t$ or $z$ distribution is used.
1.4 One Sample Matched - Continuous Outcome

Notes:

1. In this example, we seek to compare mean systolic blood pressure at an entry time and then 4 years later.
2. The null hypothesis is that the mean difference between the 2 time points is 0.
3. Since the sample size is less than 30, we need to use the t statistic.
1.5 One Sample Matched - Continuous Outcome

Notes:

1. For step 3, and referring to table 2 in the appendix in the textbook, the critical value for 14 degrees of freedom (15-1) and 2-sided type I error rate of 0.05 is <= -2.145 or >= 2.145.

2. For step 4, the calculation of the t statistic results in a value of -1.60.

3. Since -1.60 is not less than -2.145, we fail to reject the null hypothesis.
1.6 One Sample Matched - Continuous Outcome (Practice)

Practice Exercise

Example: Compare mean systolic blood pressure in 12 trial subjects before and after treatment with an anti-hypertensive drug.

1) Set up the hypothesis and determine the level of statistical significance
   \[ H_0: \]
   \[ H_1: \]
   \[ \alpha = 0.05 \]

2) Select the appropriate test statistic
   \[ z \] or \[ t \]

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Notes:
1. Not it is time to practice.
2. On your handout, write out the entries for steps 1 and 2.
3. For step 2, write out the formula for either \( z \) or \( t \), depending on which one you selected.
1.7 Practice Exercise Answers

Notes:

1. Here are the answers for steps 1 and 2.

2. The null hypothesis is that the difference in mean systolic blood pressure before and after treatment with the anti-hypertensive drug is zero.

3. The t distribution is used because the sample size of 12 is less than 30.
1.8 Practice Exercise

Notes:

1. Using your handout, complete the remaining entries.
2. You will need to look up the critical value for $t$ in table 2 of the appendix in your textbook.
1.9 Practice Exercise Answers

Notes:

1. Here are the answers.
2. The critical value for $t$ of $\leq -2.201$ or $\geq 2.201$ is based on 11 (12-1) degrees of freedom.
3. Since the $t$-value of -5.25 is less than the critical value of -2.201, we reject the null hypothesis.
1.10 Conclusion

End of Section 3.14