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**Activity: The T-Test**

# Overview

A healthcare organisation is studying the effectiveness of a new vaccine in reducing the severity of a viral infection. Two groups of participants were studied:

* Group A (Unvaccinated): Did not receive the vaccine.
* Group B (Vaccinated): Received the new vaccine.

After exposure to the virus, each participant rated the severity of their symptoms on a scale from 0 to 10 (0 = no symptoms, 10 = very severe symptoms). The goal is to determine if the vaccine significantly reduces symptom severity.

# Steps

## 1. State the Hypotheses

Specify your null hypothesis and alternative hypothesis.

| **Null Hypothesis** | *Write your hypothesis here…* |
| --- | --- |
| **Alternative Hypothesis** | *Write your hypothesis here…* |

## 2. Perform the Test

For your reference, we have provided an incomplete code snippet to run the test. Complete the code and execute it in VS Code.

The basic procedure is as follows:

1. Import Libraries: Use Python’s scipy.stats for the T-test.
2. Load the Data: Input the symptom severity scores for the two groups.
3. Run the T-Test: Use a one-tailed independent T-test to check if the vaccinated group has lower symptom severity.
4. Interpret Results: Use the t-statistic and p-value to decide if the vaccine is effective.

Reference Code:

| # Step 1: Import necessary libraries  import numpy as np  from scipy.stats import \_\_\_\_\_  # Step 2: Data for the two groups  group\_a = [7, 7, 6, 7, 8, 7, 8, 7] # Unvaccinated group  group\_b = [6, 7, 6, 7, 7, 6, 6, 7] # Vaccinated group  # Step 3: Perform the independent T-test  t\_stat, p\_value = \_\_\_\_\_  # Step 4: Print results  print(f"T-statistic: {t\_stat:.2f}")  print(f"P-value: {p\_value:.4f}")  # Step 5: Interpret the results  alpha = \_\_\_\_\_ # Significance level  if p\_value < alpha:  print(\_\_\_\_\_)  else:  print(\_\_\_\_\_) |
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## 3. Share Findings and Reflect

Stakeholders such as healthcare professionals and policymakers often rely on data-driven insights but may not have a statistical background. Communicating the meaning of the p-value, significance level, and overall results can influence decisions about further research or implementation.

Interpret your results and share your findings in a paragraph.

| *Write your response here…* |
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Points to reflect on:

* What do you notice about the t-statistic and p-value in the output?
* What can you infer about the null hypothesis?
* Does a high p-value mean the vaccine is ineffective?
* What factors could influence the p-value?
* If you were in charge of this study, would you recommend further research? Why or why not?