

# JMP® Introductory Lab Activities

## Activity 13: Hypothesis Testing, Two-Sample $t$ -Test



**Data Sets:** HTWT12.jmp and HTWT15.jmp

### Summary

It is well known that mean height for adult males is greater than for females. You are going to examine if the mean heights for 12-year-old and 15-year-old adolescent males are greater than the mean heights for similarly aged females.

You will conduct two-sample  $t$ -tests, and summarize your test results and conclusions in a report (required output and discussion is in italics).

Note: In order to conduct a two-sample  $t$ -test, the data must be stacked in one column and the labels must be stored in a separate column.

### Exploring the HTWT12 Data

Open the file **HTWT12.jmp** from the JMP **Sample Data** directory. This file contains the gender, heights and weights for 63 12-year-old students.

Choose **Analyze > Distribution** using **Height** as the **Y, Columns** variable and **Gender** as the **By** variable. Select **Uniform Scaling** and **Stack** from the **top red triangle** to compare distributions.

Look at the displays of the data to see if the conditions for using the two-sample  $t$ -test are reasonable.

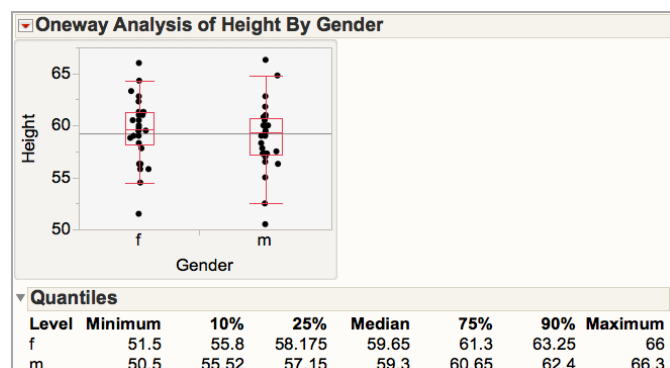
### HTWT12 Data: Conducting a Two Sample $t$ -Test

To formally compare the two distributions, use **Analyze > Fit Y by X**. Select **Height** as the **Y, Response** variable and **Gender** as the **X, Factor**. Because **Gender** is categorical, this produces side-by-side vertical dot plots for the two gender groups.

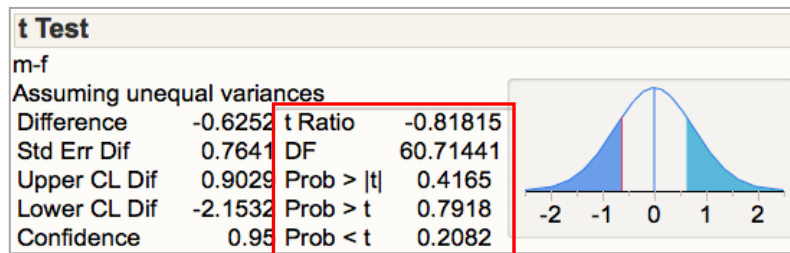
To better see the individual points, click on the red triangle and select **Display Options > Points Jittered**.

Select **Quantiles** from the red triangles to produce box plots and a table of Quantiles.

Does there appear to be a difference between the two distributions?



To continue with the analysis, select **t Test** from the red triangle. This produces a two-sample t-test without assuming that the variances are equal.



The test statistic and p-values for the two- and one-sided tests are provided in the middle of the display. For a one-sided test, the correct p-value has the same sign as the alternative hypothesis.

### Activity: Conduct a Two-Sample t-Test Using the HTWT15 Data

Repeat this analysis, using the second data set **HTWT15.jmp**, a sample of 15-year-old males and females from a high school. Test the hypothesis that the mean height for males this age is greater than the mean height for females of the same age.

*Using your results from JMP, write a complete hypothesis test, using one of the commonly used alpha levels.*

*Include:*

- Assumptions.
- Hypotheses.
- Sample statistic values.
- The test statistic.
- The p-value.
- Conclusions in the context of the problem.

*Be sure to include a graphical display of the data and hypothesis test results, with the correct p-value circled.*

*Explain how you chose the proper p-value for this test.*

*In your solution, remember to answer the original question posed.*