

## R HELP SHEET: *t*-test

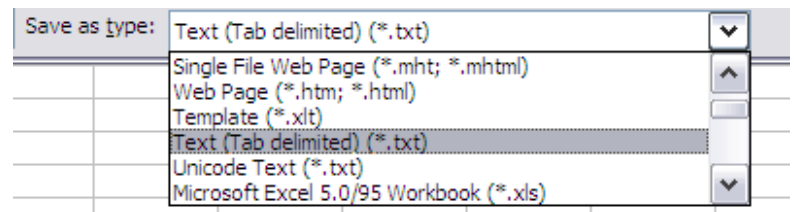
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### 1. Creating a tab delimited data file using Excel

Open Excel and type data from your dependent variable into one column and data from your independent variable into another column with appropriate headings at the top of each column (e.g., *bmd*, *sex*), then save the file as a **Text (Table delimited)(\*.txt)** with an appropriate name (e.g., *RData\_Bones*) file using **Save as type**. (Note, the example below has *sex* coded as numbers 1 and 2 but it could also be written in words e.g., *female* and *male*.)

	A	B
1	bmd	sex
2	0.972	1
3	0.732	1
4	0.874	1
5	0.943	1
6	1.024	1
7	0.755	1
8	0.779	1
9	1.007	1
10	0.816	1
11	0.755	1
12	0.871	1
13	0.721	1
14	0.727	1
15	0.796	1
16	0.612	1
17	0.775	1
18	0.849	1
19	0.773	1
20	0.649	1
21	0.865	1
22	0.905	2
23	1.016	2
24	0.873	2



### 2. Conducting a *t*-test

The text in green after the hash (#) sign is just **notes** to help you remember what's in the output: it does not get R to actually "do" anything. The text in blue is **R code** with stars representing words that are specific to the example: you need to replace this with text specific to your data as shown in the output in section 3.

To get R to conduct a *t*-test:

Open an **R-Editor** window by selecting **File** then **New script**.

Type in (or copy and paste) the notes and code below.

Replace the stars with appropriate text as indicated in notes.

Highlight everything and press **Ctrl R**.

#Importing data from tab delimited file (replace stars with an appropriate object name e.g., *bones* )

```
*****<-read.table(file.choose(),header=T)
```

```
attach(*****)
```

```
names(*****)
```

#Conducting a *t*-test (replace stars with appropriate text e.g., *bmd*, *sex*)

```
t.test(**~*****,var.equal=TRUE)
```

### 3. Identifying the key elements of the output

Following the instructions above will produce the following output in the **R Console** window: the **key elements** are annotated in orange.

```
> #Importing data from tab delimited file (replace stars with an appropriate object name e.g.,bones)
> bones<-read.table(file.choose(),header=TRUE)
> attach(bones)
> names(bones)
[1] "bmd" "sex"
>
> #Conducting a t-test (replace stars with sample headings e.g.,female, male)
> t.test(female,male,var.equal=TRUE)
```

Two Sample t-test      **Statistic**      **Degrees of Freedom**      **P Value**

```
data: bmd by sex
t = -2.0607, df = 38, p-value = 0.04623
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
-0.129252391 -0.001147609
sample estimates:
mean of x mean of y
0.81475 0.87995
```

**95% CI of Effect size**

**Effect size = the difference between these means**

In summary the key information from the test is

**$t_{38}=2.06, P=0.046$**

And the unstandardized effect size (estimated difference between the populations) is

**-0.065 (female–male; 95% CI [-0.130, -0.011])**

### 4. Additional notes

a. There is a version of the t-test that does not assume equal variances: the R Code for this is given below.

**#Conducting a t-test not assuming equal variances**

**t.test(\*\*\*\*, \*\*\*\*)**

For example: **t.test(bmd~sex)**

b. If your data are in “sample layout” (data from dependent variable in different columns with categories of independent variable as column headings) rather than “variable layout” (data from dependent variable in one column and from independent in another) use the following code:

**#Conducting a t-test (replace stars with sample headings e.g.,female, male)**

**t.test(\*\*\*\*, \*\*\*\*, var.equal=TRUE)**

For example: **t.test(female,male,var.equal=TRUE)**