

T TEST

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T TEST

```
library(tidyverse)
library(report)
```

```
df <- starwars
df <- df %>% select(sex, height) %>%
  filter(sex %in% c('male', 'female')) %>%
  drop_na(height)

t.test(height~sex, data = df) %>% report()
```

```
## Warning: Unable to retrieve data from htest object.
##   Returning an approximate effect size using t_to_d().

## Effect sizes were labelled following Cohen's (1988) recommendations.
##
## The Welch Two Sample t-test testing the difference of height by sex (mean in
## group female = 171.57, mean in group male = 179.12) suggests that the effect is
## negative, statistically not significant, and small (difference = -7.55, 95% CI
## [-20.40, 5.29], t(48.47) = -1.18, p = 0.243; Cohen's d = -0.34, 95% CI [-0.90,
## 0.23])
```

```
library(gapminder) #dataset
library(patchwork)
```

Single Sample T TEST

H0: Mean life expectancy is 50 years

H1: mean life expectancy is not 50 years

Observation: mean of x 48.86533

```
gapminder %>% filter(continent=="Africa") %>%
  select(lifeExp) %>%
  t.test(mu=50, conf.level = TRUE)
```

```
##
## One Sample t-test
##
## data: .
## t = -3.0976, df = 623, p-value = 0.002038
## alternative hypothesis: true mean is not equal to 50
## 100 percent confidence interval:
## -Inf Inf
## sample estimates:
## mean of x
## 48.86533

# Observation: mean of x 48.86533
# p-value = 0.002038 Reject H0, #true mean is not equal to 50
test <- gapminder %>% filter(continent=="Africa") %>%
  select(lifeExp) %>%
  t.test(mu=50)
report(test)
```

```
## Warning: Unable to retrieve data from htest object.
## Returning an approximate effect size using t_to_d().

## Effect sizes were labelled following Cohen's (1988) recommendations.
##
## The One Sample t-test testing the difference between . (mean = 48.87) and mu =
## 50 suggests that the effect is negative, statistically significant, and very
## small (difference = -1.13, 95% CI [48.15, 49.58], t(623) = -3.10, p = 0.002;
## Cohen's d = -0.12, 95% CI [-0.20, -0.05])
```

Two sided T-TEST for difference of means

```
df <- gapminder %>% select(continent, lifeExp) %>%
  filter(continent %in% c('Africa', 'Europe'))
test1 <- t.test(lifeExp~continent, alternative='two.sided', data = df)
test1
```

```
##
## Welch Two Sample t-test
##
## data: lifeExp by continent
## t = -49.551, df = 981.2, p-value < 2.2e-16
## alternative hypothesis: true difference in means between group Africa and group Europe is not equal
## 95 percent confidence interval:
## -23.95076 -22.12595
## sample estimates:
## mean in group Africa mean in group Europe
## 48.86533 71.90369

report(test1)
```

```
## Warning: Unable to retrieve data from htest object.
##   Returning an approximate effect size using t_to_d().

## Effect sizes were labelled following Cohen's (1988) recommendations.
##
## The Welch Two Sample t-test testing the difference of lifeExp by continent
## (mean in group Africa = 48.87, mean in group Europe = 71.90) suggests that the
## effect is negative, statistically significant, and large (difference = -23.04,
## 95% CI [-23.95, -22.13], t(981.20) = -49.55, p < .001; Cohen's d = -3.16, 95%
## CI [-3.35, -2.98])
```

One Sided T-TEST

```
df1 <- gapminder %>% select(country, lifeExp) %>%
  filter(country %in% c('Ireland', 'Switzerland'))
test2 <- t.test(lifeExp~country, alternative='less', data = df1)
test2
```

```
##
##   Welch Two Sample t-test
##
## data:  lifeExp by country
## t = -1.6337, df = 21.77, p-value = 0.05835
## alternative hypothesis: true difference in means between group Ireland and group Switzerland is less
## 95 percent confidence interval:
##      -Inf 0.1313697
## sample estimates:
##      mean in group Ireland mean in group Switzerland
##              73.01725              75.56508
```

```
report(test2)
```

```
## Warning: Unable to retrieve data from htest object.
##   Returning an approximate effect size using t_to_d().

## Effect sizes were labelled following Cohen's (1988) recommendations.
##
## The Welch Two Sample t-test testing the difference of lifeExp by country (mean
## in group Ireland = 73.02, mean in group Switzerland = 75.57) suggests that the
## effect is negative, statistically not significant, and medium (difference =
## -2.55, 95% CI [-Inf, 0.13], t(21.77) = -1.63, p = 0.058; Cohen's d = -0.70, 95%
## CI [-Inf, 0.03])
```

Paired T-TEST

```
df2 <- gapminder %>% filter(year %in% c(1957, 2007),
  continent=='Africa') %>%
  mutate(year=factor(year, levels=c(2007, 1957)))

test3 <- t.test(lifeExp~year, data = df2, paired=TRUE)
test3 %>% report()
```

```
## Warning: Unable to retrieve data from htest object.  
##   Returning an approximate effect size using t_to_d().  
  
## Effect sizes were labelled following Cohen's (1988) recommendations.  
##  
## The Paired t-test testing the difference of lifeExp by year (mean difference =  
## 13.54) suggests that the effect is positive, statistically significant, and  
## large (difference = 13.54, 95% CI [11.15, 15.93],  $t(51) = 11.38$ ,  $p < .001$ ;  
## Cohen's  $d = 1.59$ , 95% CI [1.18, 2.00])
```