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Comprehensive Report

```
library(tidyverse) # for piping and functions like select/filter etc
library(gtsummary) # for tabling in results
library(scales) # for p-value formatting
```

Updates

- added some text to ReadMe.md files
- added session info

Project Summary

We are interested in comparing weight of vehicles with their gas mileage. We hypothesize that vehicles that weigh more than 3,500 lbs will have worse gas mileage than the vehicles that do not.

Note this (comprehensive) report will be very similar to the collaborator report, differing only by inclusion of code chunks

```
# we are using mtcars
dat_raw <- mtcars
```

Data Management

Create a new binary variable for vehicle weight.

```
# categorical weight variable
dat <- dat_raw %>%
  # name variables appropriately and using similar style (snake_case, camelCase or PascalCase)
  dplyr::mutate(wt_cat = dplyr::case_when(wt > 3.5 ~ "Heavier than 3500lbs",
                                          wt <= 3.5 ~ "3500lbs or lighter")
  )
```

Analysis

Analysis plan initially included a t-test to compare mileage (mpg) between lighter and heavier cars. Later, the analysis team felt a continuous approach would be more applicable. A linear model including mpg as the outcome and weight (per 1000lbs) as a covariate was utilized.

```r
model_ttest <- t.test( dat$mpg ~ dat$wt_cat)
model_ttest
```

```
##
##  Welch Two Sample t-test
##
## data:  dat$mpg by dat$wt_cat
## t = 5.8216, df = 29.974, p-value = 2.305e-06
## alternative hypothesis: true difference in means between group 3500lbs or lighter and group Heavier
## 95 percent confidence interval:
##   5.332544 11.096027
## sample estimates:
##   mean in group 3500lbs or lighter mean in group Heavier than 3500lbs
##                           22.91429                           14.70000
```

```r
# Using snake_case still
m_linear <- lm(mpg ~ wt, data = dat)
summary(m_linear)
```

```
##
## Call:
## lm(formula = mpg ~ wt, data = dat)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -4.5432 -2.3647 -0.1252  1.4096  6.8727
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  37.2851     1.8776  19.858  < 2e-16 ***
## wt           -5.3445     0.5591  -9.559 1.29e-10 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 3.046 on 30 degrees of freedom
## Multiple R-squared:  0.7528, Adjusted R-squared:  0.7446
## F-statistic: 91.38 on 1 and 30 DF,  p-value: 1.294e-10
```

Results

The t test comparing mean gas mileage between cars that weigh over 3500lbs and those who do not resulted in a significant difference (test statistic = 5.82, p <0.01). Linear model provided similar results with every additional thousand pound increase in vehicle weight resulting in 5.34 less miles per gallon (p <0.01). Both t test and linear model indicate an inverse relationship between vehicle weight and gas mileage.

```r
gtsummary::tbl_regression(m_linear, label = wt ~ "Weight")
```

Characteristic	Beta	95% CI	p-value
Weight	-5.3	-6.5, -4.2	<0.001

Session Info

```
writeLines(capture.output(sessionInfo()), "comprehensive_session_info.txt")
```