Analysis_Master

Master Analysis

```
##Loading necessary items
#| echo: false
#| warning: false
library(repeatData)
library(readxl)
library(tidyverse)
```

```
-- Attaching core tidyverse packages ------------------------ tidyverse 2.0.0 --
v dplyr     1.1.2     v readr     2.1.4
v forcats   1.0.0     v stringr   1.5.0
v ggplot2   3.4.3     v tibble    3.2.1
v lubridate 1.9.2     v tidyr     1.3.0
v purrr     1.0.2
-- Conflicts ------------------------------------------ tidyverse_conflicts() --
x dplyr::filter() masks stats::filter()
x dplyr::lag()    masks stats::lag()
i Use the conflicted package (<http://conflicted.r-lib.org/>) to force all conflicts to beco
```

```
library(gt)
library(lme4)
```

```
Loading required package: Matrix

Attaching package: 'Matrix'

The following objects are masked from 'package:tidyr':

    expand, pack, unpack
```

```
library(irr)
```

```
Loading required package: lpSolve
```

```
Warning: package 'lpSolve' was built under R version 4.3.3
```

```
data(final.data)
data("cycling.data?")
```

```
Warning in data("cycling.data?"): data set 'cycling.data?' not found
```

##Descriptive Statistics

```
descript <- final.data %>%
select(id, timepoint, test, period, sex, weight, age, vo2.kg, rel.vo2, vo2, watt) %>%
  filter(period == 1, test == "max", timepoint == "pre",
         !id %in% c(6,11, 20, 21, 25, 35, 37, 52, 53, 54, 56, 57)) %>%
  group_by() %>%
 summarise(N = n(),
            Age = paste(round(mean(age, na.rm = TRUE),2),
                        round(sd(age, na.rm = TRUE),2),
                        sep = " ± "),
            Weight = paste(round(mean(weight, na.rm = TRUE),2),
                        round(sd(weight, na.rm = TRUE),2),
                        sep = " ± "),
           rel.VO2max = paste(round(mean(vo2.kg, na.rm = TRUE),2),
                        round(sd(vo2.kg, na.rm = TRUE),2),
                        sep = " ± "),
           VO2max = paste(round(mean(vo2, na.rm = TRUE),2),
                        round(sd(vo2, na.rm = TRUE),2),
                        sep = " ± "),
           Wmax = paste(round(mean(watt, na.rm = TRUE),2),
                        round(sd(watt, na.rm = TRUE),2),
                        sep = " ± ")) %>%
 mutate(N = as.character(N)) %>%
  pivot_longer(names_to = "variables",
               values_to = "values",
               cols = N:Wmax) %>%
gt() %>%
```

```
  cols_label(variables = "Variables",
             values = "Mean ± SD") %>%
    tab_header(title = "Baseline Characteristics")

    descript
```

Baseline Characteristics

Variables	Mean ± SD
N	42
Age	53.92 ± 8.69
Weight	85.95 ± 19.48
rel.VO2max	33.33 ± 6.98
VO2max	2868.13 ± 896.5
Wmax	226.2 ± 70.8

##Test to calculate TE and CV on duplicate pre-measures on VO2max for reliability

```
  test <- cycling.data %>%
    select(id, period, timepoint, test, vo2) %>%
    filter(test == "max", (timepoint == 2 | timepoint == 3), period == 1) %>%
    pivot_wider(names_from = timepoint, values_from = vo2, names_prefix = "timepoint_") %>%
    mutate(diff = timepoint_3 - timepoint_2) %>%
    summarise (mean_diff = mean(diff, na.rm = TRUE),
               mean = mean(c(timepoint_2, timepoint_3),na.rm = T),
               sd_diff = sd(diff, na.rm = TRUE),
               te = sd_diff / sqrt(2),
               cv = (te / mean) * 100) %>%
    print()
```

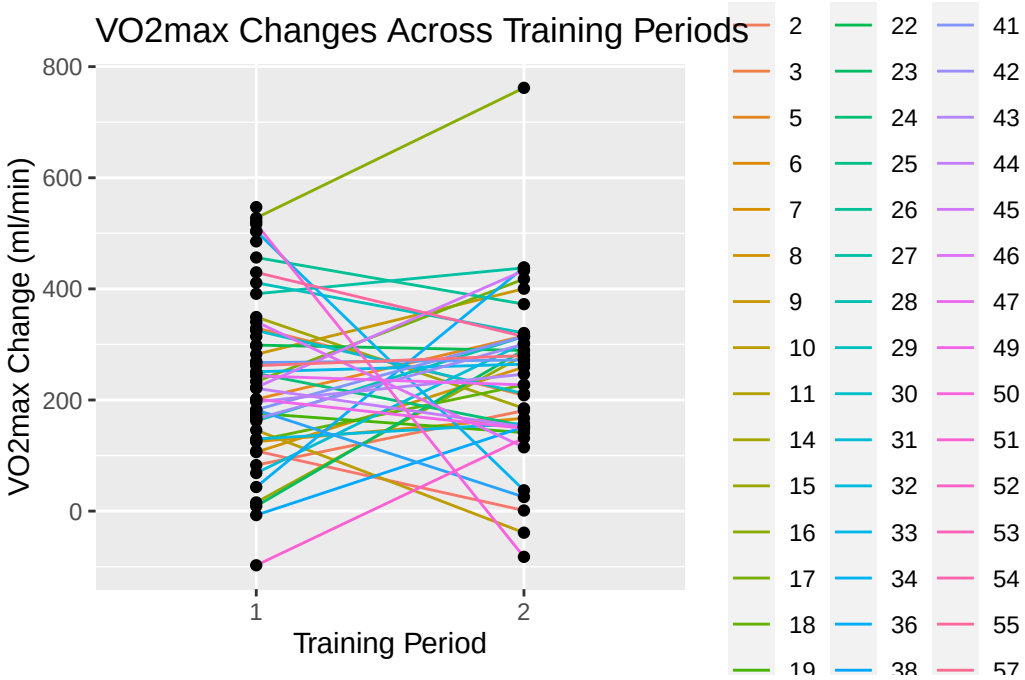
```
# A tibble: 1 x 5
  mean_diff  mean sd_diff    te    cv
      <dbl> <dbl>   <dbl> <dbl> <dbl>
1     -38.5 2784.    102.  72.3  2.60
```

Try to calculate Mixed Effects Model for VO2max

```
mixed <- final.data %>%
  select(id, period, timepoint, test, vo2) %>%
  filter(test == "max") %>%
  pivot_wider(names_from = timepoint, values_from = vo2)
mixed <- na.omit(mixed)
   mixed$change <-mixed$post - mixed$pre

  #Build to Model

   model <- lmer(change ~ period + (1 | id), data = mixed)
summary(model) %>%
  print()
```

```
Linear mixed model fit by REML ['lmerMod']
Formula: change ~ period + (1 | id)
   Data: mixed

REML criterion at convergence: 1180.3

Scaled residuals:
     Min       1Q   Median       3Q      Max
-2.30035 -0.53811 -0.01148  0.51664  2.83889

Random effects:
 Groups   Name        Variance Std.Dev.
 id       (Intercept)  4303     65.6
 Residual             19181    138.5
Number of obs: 93, groups:  id, 51

Fixed effects:
            Estimate Std. Error t value
(Intercept)  249.252     21.459  11.615
period2       -3.654     29.113  -0.126

Correlation of Fixed Effects:
        (Intr)
period2 -0.602
```

```r
##Visualize

ggplot(mixed, aes(x = period, y = change, group = id)) +
  geom_line(aes(color = factor(id))) +
  geom_point() +
  labs(title = "VO2max Changes Across Training Periods",
       x = "Training Period",
       y = "VO2max Change (ml/min)")
```



ICC analysis

```r
icc <- final.data %>%
  select(id, period, timepoint, test, vo2) %>%
  filter(test == "max") %>%
  pivot_wider(names_from = timepoint, values_from = vo2) %>%
  mutate(change = post - pre) %>%
  select(id, period, change) %>%
  pivot_wider(names_from = period, values_from = change) %>%
  na.omit() %>%
  print()
```

```
# A tibble: 42 x 3
# Groups:   id [42]
   id      `1`    `2`
   <fct> <dbl>  <dbl>
 1 1     108.    1.17
 2 2      82.8 181.
 3 3     330.  208.
 4 5     201.  315.
 5 7     125   167.
 6 8     106.  259.
 7 9     282.  400.
 8 10    146.  -38.8
 9 14    349.  185
10 15     15.7 280.
# i 32 more rows
```

```r
icc_result <- icc(icc [, -1], model = "twoway", type = "agreement")
print(icc_result)
```

```
 Single Score Intraclass Correlation

   Model: twoway
   Type : agreement

   Subjects = 42
     Raters = 2
   ICC(A,1) = 0.174

 F-Test, H0: r0 = 0 ; H1: r0 > 0
 F(41,41.2) = 1.41 , p = 0.135

 95%-Confidence Interval for ICC Population Values:
  -0.138 < ICC < 0.453
```

Pearsons Correlation