Week 3 Solutions

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2019-10-21

## Problem 1

VO2max ml kg-1 min-1 increased from pre (mean (SD), 59.9 (6.5)) to meso1 (61.4 (7.1)) with mean difference being 1.5 ml kg-1 min-1 (95% CI: -0.12, 3.07, p=0.068). The null-hypothesis of no differences between means could not be rejected at the = 0.05 level. Instead of a paired-sample t-test, we could calculate difference between time-point for each participant and use these data in a one sample t-test.

## Problem 2

The mean difference was estimated to -2.77% 95% CI: [-5.55, 0.01]. We would reject the null-hypothesis at the level of = 0.05.

## Problem 3

The mean change score in DECR was 4.63% (SD: 4.12) and 7.65 (6.36) in INCR. The mean difference was -3.02%-point (95% CI: [-9.52, 3.49], p-value=0.327). The null hypothesis of no difference between groups was not rejected at = 0.05.

## Code for each problem

### Problem 1

library(tidyverse); library(readxl)  
  
cdat <- read\_excel("./data/cyclingStudy.xlsx", na = "NA") %>%  
 select(subject, timepoint, weight.T1, VO2.max) %>%  
 mutate(vo2max.kg = VO2.max / weight.T1) %>%  
 select(-weight.T1, -VO2.max) %>%  
 filter(timepoint %in% c("pre", "meso1")) %>%  
 pivot\_wider(names\_from = timepoint,   
 values\_from = vo2max.kg)   
  
  
# descriptive statistics  
pre.m <- round(mean(cdat$pre), 1)  
meso1.m <- round(mean(cdat$meso1), 1)  
  
pre.sd <- round(sd(cdat$pre), 1)  
meso1.sd <- round(sd(cdat$meso1), 1)  
  
# Creating the t-test  
ttest\_vo2max <- t.test(cdat$meso1, cdat$pre, paired = TRUE)  
  
est <- round(ttest\_vo2max$estimate, 1)  
conf <- round(ttest\_vo2max$conf.int, 2)  
p.value <- round(ttest\_vo2max$p.value,3)

### Problem 2

cdat <- read\_excel("./data/cyclingStudy.xlsx", na = "NA") %>%  
 select(subject, timepoint, sj.max) %>%  
 pivot\_wider(names\_from = timepoint,   
 values\_from = sj.max) %>%  
 mutate(change = 100 \* (meso1 - pre) / pre)   
  
  
sj\_ttest <- t.test(cdat$change, mu = 0)  
  
est <- round(sj\_ttest$estimate, 2)  
conf <- round(sj\_ttest$conf.int, 2)

### Problem 3

cdat <- read\_excel("./data/cyclingStudy.xlsx", na = "NA") %>%  
 select(subject, group, timepoint, VO2.max) %>%  
 filter(group != "MIX") %>%  
 pivot\_wider(names\_from = timepoint,   
 values\_from = VO2.max) %>%  
 mutate(change = 100 \* (meso3-pre)/pre)   
  
  
sum\_stats <- cdat %>%  
 group\_by(group) %>%  
 summarise(m = round(mean(change, na.rm = TRUE), 2),  
 s = round(sd(change, na.rm = TRUE), 2))   
  
  
ttest\_group <- t.test(change ~ group, data = cdat)  
  
  
est <- round(ttest\_group$estimate[1] - ttest\_group$estimate[2], 2)  
conf <- round(ttest\_group$conf.int, 2)  
pval <- round(ttest\_group$p.value, 3)