Lying with Statistics Project

Contents

Diploma

PROOF :)

1 Data manipulation

1.1 Cleans up the RMD output and files by ensuring they don't fall off the page

```
options(tinytex.verbose = TRUE)
options(digits = 5)

#Load Libraries
Libraries <- c("knitr", "readr")
for (p in Libraries) {
  library(p, character.only = TRUE)
}

opts_chunk$set(fig.align='center',
               external=TRUE,
               echo=TRUE,
               warning=FALSE,
               fig.pos='H',
               tidy.opts=list(width.cutoff=60),
               tidy=TRUE,
               warning = FALSE
)
```

1.2 Install and load all required packages (Don't install in rmd)

```
# install.packages('dplyr') install.packages('tidyverse')
# install.packages('knitr') install.packages('readr')
# install.packages('finalfit')

library("tidyverse")
library("dplyr")
library("knitr")
library("readr")
```

1.3 Read in files based on type, headers, and with specific NA values accounted for

```
setwd("./Data")
w1_child <- read.csv("w1_child.csv", header = TRUE, na.strings = c("9",
    "8", "98", "99"))
w2_child <- read.table("w2_child.dat", header = TRUE, , na.strings = c("-999"))
w3_child <- read.csv("w3_child.csv", header = TRUE, na.strings = c("9",
    "8", "98", "99"))
w4_child <- read.csv("w4_child.csv", header = FALSE, na.strings = c("9",
    "8", "98", "99"))
names_w4_child <- read.table("names_w4_child.txt")
educinc <- read.csv("educinc.csv", header = TRUE, na.strings = c("."))
```

1.4 Add transposed variable names to w4_child based off of the provided text file

```
names(w4_child) <- t(names_w4_child)
```

1.5 Make all headers into lower case for easier merging

```
names(w1_child) <- tolower(names(w1_child))
names(w2_child) <- tolower(names(w2_child))
names(w3_child) <- tolower(names(w3_child))
names(w4_child) <- tolower(names(w4_child))
names(educinc) <- tolower(names(educinc))
```

1.6 Merge files by famid and select specified variables

```
w1234 <- (list(w1_child, w2_child, w3_child, w4_child, educinc) %>%
    reduce(full_join, by = "famid")) %>%
    dplyr::select(famid, c01cohort, c01gender, c01school, c01sibli,
        contains("atts"), contains("pcmp"), contains("attt"),
        contains("dscr"), contains("atod"), fameduc, income,
        c01sibli, contains("edex"))
```

1.7 Reverse code for pcmp 1 and 2

```
pcmp_01_02_cols <- c(grep("pcmp01", names(w1234)), grep("pcmp02",
    names(w1234)))
w1234[, pcmp_01_02_cols] <- 5 - w1234[, pcmp_01_02_cols]
```

1.8 Compute averages based on sets of columns for variable sets and place average into a new variable

```
w1234$c01attt <- rowMeans(w1234[c(grep("c01attt", names(w1234)))],
    na.rm = TRUE)
w1234$c04attt <- rowMeans(w1234[c(grep("c04attt", names(w1234)))],
    na.rm = TRUE)

w1234$c01pcmp <- rowMeans(w1234[c(grep("c01pcmp", names(w1234)))],
    na.rm = TRUE)
w1234$c04pcmp <- rowMeans(w1234[c(grep("c04pcmp", names(w1234)))],
    na.rm = TRUE)

w1234$c01dscr <- rowMeans(w1234[c("c01dscr07", "c01dscr08", "c01dscr09",
    "c01dscr10")], na.rm = TRUE)
w1234$c04dscr <- rowMeans(w1234[c("c04dscr07", "c04dscr08", "c04dscr09",
```

```
    "c04dscr10")], na.rm = TRUE)

w1234$c01atts <- rowMeans(w1234[c("c01atts03", "c01atts07", "c01atts08",
    "c01atts10")], na.rm = TRUE)
w1234$c02atts <- rowMeans(w1234[c("c02atts03", "c02atts07", "c02atts08",
    "c02atts10")], na.rm = TRUE)
w1234$c03atts <- rowMeans(w1234[c("c03atts03", "c03atts07", "c03atts08",
    "c03atts10")], na.rm = TRUE)
w1234$c04atts <- rowMeans(w1234[c("c01atts03", "c04atts07", "c04atts08",
    "c04atts10")], na.rm = TRUE)

w1234$c01atod <- rowSums(w1234[c("c01atod01", "c01atod02", "c01atod03",
    "c01atod04", "c01atod05", "c01atod06", "c01atod07", "c01atod08",
    "c01atod09")], na.rm = TRUE)
w1234$c04atod <- rowSums(w1234[c("c04atod01", "c04atod02", "c04atod03",
    "c04atod04", "c04atod05", "c04atod06", "c04atod07", "c04atod08",
    "c04atod09")], na.rm = TRUE)
```

1.9 Create difference scores between Waves 1 and 4

```
score_variables <- c("atts", "pcmp", "attt", "dscr", "atod")
w1234[paste("difference_", score_variables, sep = "")] <- w1234[paste("c01",
    score_variables, sep = "")] - w1234[paste("c04", score_variables,
    sep = "")]
ave_abs_change <- abs(colMeans(w1234[, c("difference_atts", "difference_pcmp",
    "difference_attt", "difference_dscr", "difference_atod")],
    na.rm = TRUE))

atts <- abs(mean(w1234$c01atts - w1234$c04atts, na.rm = TRUE))
pcmp <- abs(mean(w1234$c01pcmp - w1234$c04pcmp, na.rm = TRUE))
attt <- abs(mean(w1234$c01attt - w1234$c04attt, na.rm = TRUE))
dscr <- abs(mean(w1234$c01dscr - w1234$c04dscr, na.rm = TRUE))
atod <- abs(mean(w1234$c01atod - w1234$c04atod, na.rm = TRUE))
```

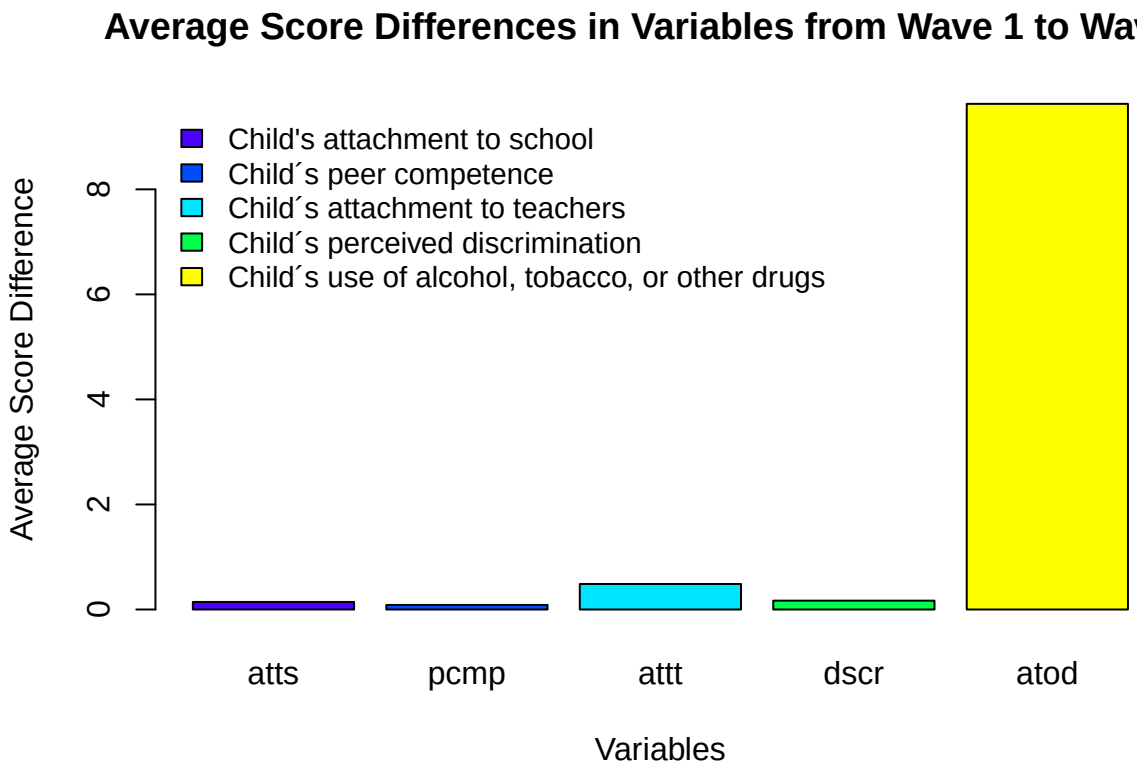
1.10 Function to generate a random vector of colors in order from

```
color_vector <- function(num) {
    return(topo.colors(num))
}
```

2 A fair figure depicting data

```
average_change <- c(atts, pcmp, attt, dscr, atod)
barplot(average_change, main = "Average Score Differences in Variables from Wave 1 to Wave 4 ",
    xlab = "Variables", ylab = "Average Score Difference", names.arg = c("atts",
        "pcmp", "attt", "dscr", "atod"), col = color_vector(5))
```

```
legend("topleft", c("Child's attachment to school", "Child's peer competence",
    "Child's attachment to teachers", "Child's perceived discrimination",
    "Child's use of alcohol, tobacco, or other drugs"), cex = 0.9,
    bty = "n", fill = color_vector(5))
```



3 Conducting a statistical test such as t-squared test on girls vs boys

3.1 Recode girls and boys

```
w1234$c01gender[w1234$c01gender == 1] = "girl"
w1234$c01gender[w1234$c01gender == 2] = "boy"
```

4 Compare differences across genders by creating a t-test for genders function

```
t_test_gender <- function(score_var) {
    return(t.test(score_var ~ c01gender, paired = FALSE, data = w1234))
```

```
}

tatod <- t_test_gender(w1234$difference_atod)
tattt <- t_test_gender(w1234$difference_attt)
tatts <- t_test_gender(w1234$difference_atts)
tdscr <- t_test_gender(w1234$difference_dscr)
tpcmp <- t_test_gender(w1234$difference_pcmp)

tatod
```

```
##
##  Welch Two Sample t-test
##
## data:  score_var by c01gender
## t = -0.122, df = 669, p-value = 0.9
## alternative hypothesis: true difference in means between group boy and group girl is not equal to 0
## 95 percent confidence interval:
##  -0.87090  0.76865
## sample estimates:
##  mean in group boy mean in group girl
##            -9.6409            -9.5898
```

```
tattt
```

```
##
##  Welch Two Sample t-test
##
## data:  score_var by c01gender
## t = 1.32, df = 581, p-value = 0.19
## alternative hypothesis: true difference in means between group boy and group girl is not equal to 0
## 95 percent confidence interval:
##  -0.043818  0.221895
## sample estimates:
##  mean in group boy mean in group girl
##            0.52987            0.44083
```

```
tatts
```

```
##
##  Welch Two Sample t-test
##
## data:  score_var by c01gender
## t = 0.055, df = 666, p-value = 0.96
## alternative hypothesis: true difference in means between group boy and group girl is not equal to 0
## 95 percent confidence interval:
##  -0.087517  0.092561
## sample estimates:
##  mean in group boy mean in group girl
##            0.14484            0.14232
```

```
tdscr
```

```
##
##  Welch Two Sample t-test
##
## data:  score_var by c01gender
## t = 0.0432, df = 572, p-value = 0.97
## alternative hypothesis: true difference in means between group boy and group girl is not equal to 0
## 95 percent confidence interval:
##  -0.077353  0.080834
## sample estimates:
##  mean in group boy mean in group girl
##            0.16956            0.16782
```

```
tpcmp
```

```
##
##  Welch Two Sample t-test
##
## data:  score_var by c01gender
## t = 1.19, df = 579, p-value = 0.23
## alternative hypothesis: true difference in means between group boy and group girl is not equal to 0
## 95 percent confidence interval:
##  -0.031859  0.130578
## sample estimates:
##  mean in group boy mean in group girl
##           0.111693           0.062333
```

5 Display statistical analysis results of gender variances across score differences

5.1 Function to extract p values from t-test result text

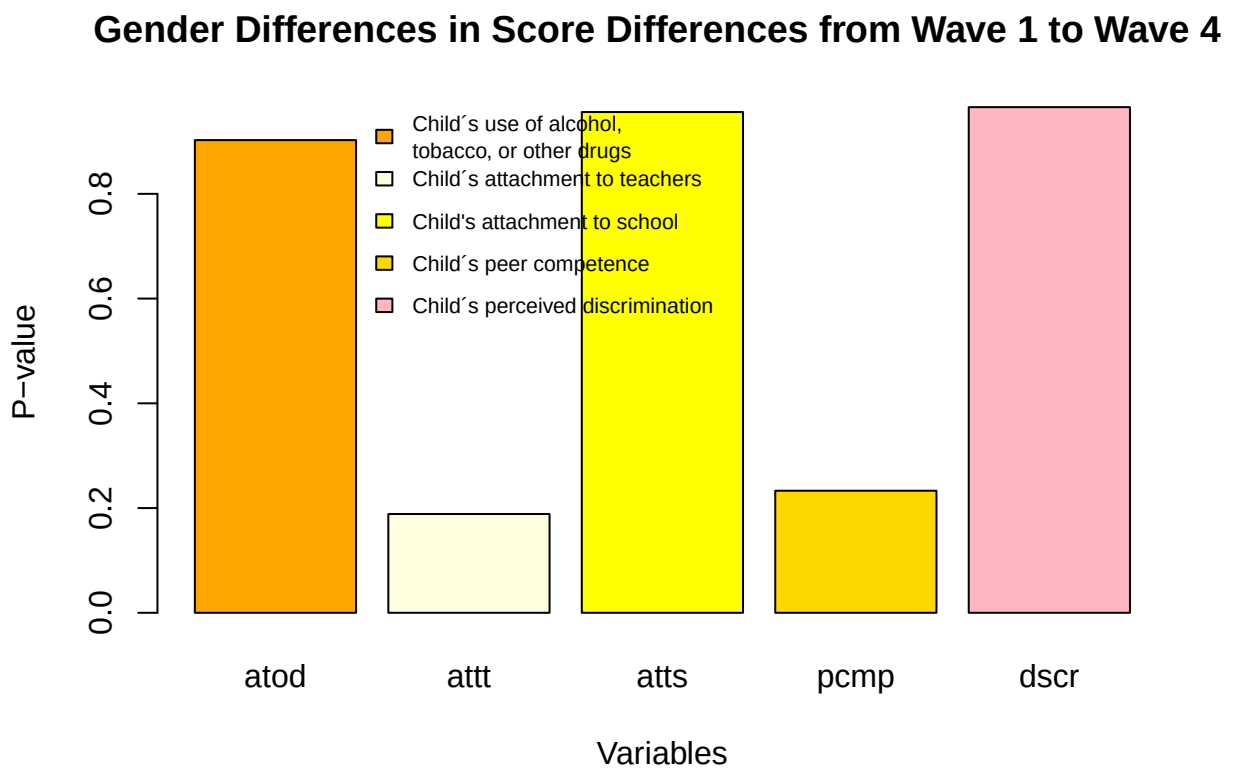
```
extract_pval <- function(ttest) {
    return(ttest$p.value)
}
```

5.2 Graph p values

```
p_values <- c(extract_pval(tatod), extract_pval(tattt), extract_pval(tatts),
    extract_pval(tpcmp), extract_pval(tdscr))
barplot(p_values, main = "Gender Differences in Score Differences from Wave 1 to Wave 4 ",
    xlab = "Variables", ylab = "P-value", names.arg = c("atod",
        "attt", "atts", "pcmp", "dscr"), col = c("orange", "lightyellow",
        "yellow", "gold", "lightpink"))

legend(1.2, 0.99, c("Child's use of alcohol,\ntobacco, or other drugs",
```

```
    "Child's attachment to teachers", "Child's attachment to school",
    "Child's peer competence", "Child's perceived discrimination"),
    cex = 0.7, bty = "n", fill = c("orange", "lightyellow", "yellow",
        "gold", "lightpink"))
```



6 Interpretation of results

6.1 S

7 Figure and analysis that provides a distorted version of what we actually would find in the data.

7.1 Code to determine which p_values are stastically significant i.e., <0.05

```
p_values[p_values < 0.05] = "yes"
p_values[p_values > 0.05] = "ABSOLUTELY NO CHANGE"
percent_not_significant <- c(length(p_values[p_values > 0.05])/5 *
    100, length(p_values[p_values < 0.05])/5 * 100)
```

8 Figure that significantly simplies the data

```
pie(percent_not_significant, col = c("red", "blue"), labels = percent_not_significant,
    main = "% of Score Difference Variables that Statistically Differed by Gender")

legend(-2.1, 1.05, c("STATISTICALLY NO DIFFERENCE", "yes"), cex = 0.8,
    fill = c("red", "blue"))
```