Relationship between Pereived Mental Health and Sense of Belonging into Local Community

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Load the libraries that we need to use for our statisticsl analysis

```
library(tinytex)
library(knitr)
library(tidyverse)
library(janitor)
library(mosaic)
library(patchwork)
```

Reading Data into R

We first start by reading a data file into R.

```
CCHS <- read_csv("CCHS.csv")
```

Convert Character Variable Columns to Numeric Variables

```
CCHS.Num <- CCHS %>% mutate_if(is.character, as.numeric)
```

Filter Data

```
## Filtering by
## Whether or Not Attending School/College/University (1 = Yes, 2 = No)
## Age Range (2 = 15-17, 3 = 18-19, 4 = 20-24, 5 = 25-29)
CCHS.2 <- CCHS.Num %>% filter((MAC_015 == 1 | MAC_015 == 2), (dhhgage > 1 & dhhgage <= 5))
```

Frequency Distribution Tables

```
CCHS.2 %>%
  count(GEN_015)
```

```
## # A tibble: 6 x 2
##   GEN_015     n
##     <dbl> <int>
## 1       1  5208
## 2       2  6228
## 3       3  4301
## 4       4  1443
## 5       5   335
## 6      NA   479
```

```
CCHS.2 %>%
  count(GEN_030)
```

```
## # A tibble: 5 x 2
##   GEN_030     n
##     <dbl> <int>
## 1       1  2532
## 2       2  9087
## 3       3  4474
## 4       4  1308
## 5      NA   593
```

```
CCHS.2 <- CCHS.2 %>% drop_na(GEN_015, GEN_030)
CCHS.2 %>%
  count(GEN_015)
```

```
## # A tibble: 5 x 2
##   GEN_015     n
##     <dbl> <int>
## 1       1  5173
## 2       2  6190
## 3       3  4262
## 4       4  1434
## 5       5   331
```

```
CCHS.2 %>%
  count(GEN_030)
```

```
## # A tibble: 4 x 2
##   GEN_030     n
##     <dbl> <int>
## 1       1  2527
## 2       2  9085
## 3       3  4471
## 4       4  1307
```

Re-categorize levels

```r
# Positive Mental Health:
# Yes as Excellent, Very Good, Good; No as Fair or Poor
# Sense of Belonging:
# Strong as Very Strong, or Somewhat Strong; No as Somewhat Weak or Very Weak
CCHS.2 <- CCHS.2 %>%
  mutate(Positive.Mental.Health = case_when(GEN_015 <= 3 ~ "Yes",
                                            GEN_015 >= 4 ~ "No"),
         Sense.of.Belonging = case_when(GEN_030 <=2 ~ "Strong",
                                        GEN_030 == 3 | GEN_030 == 4 ~ "Weak"),
          Gender = case_when(DHH_SEX == 1 ~ "Male",
                             DHH_SEX == 2 ~ "Female"))
```

Contingency Table for Mental Health and Sense of Belonging

```r
# Two-way Table using {janitor} package
# data frame
CCHS.2 %>%
  # cross-tabulate counts of two columns
  tabyl(Sense.of.Belonging, Positive.Mental.Health) %>%
  # add a total row, add a total column
  adorn_totals(where = c("row", "col")) %>%
  # convert to proportions with row denominator
  adorn_percentages(denominator = "row") %>%
  # convert proportions to percents
  adorn_pct_formatting() %>%
  # display as: "count (percent)"
  adorn_ns(position = "front") %>%
  # adjust titles
  adorn_title(
    row_name = "Sense of Belonging",
    col_name = "Positive Mental Health") %>%
  # print elegant results for interactive analysis or for sharing in a report
  # e.g., with knitr::kable()
  knitr::kable()
```

	Positive Mental Health		
Sense of Belonging	No	Yes	Total
Strong	860 (7.4%)	10752 (92.6%)	11612 (100.0%)
Weak	905 (15.7%)	4873 (84.3%)	5778 (100.0%)
Total	1765 (10.1%)	15625 (89.9%)	17390 (100.0%)

```r
# Two-way Table using {mosaic} package
tally(~ Sense.of.Belonging + Positive.Mental.Health, margin = TRUE, data = CCHS.2)
```

```
##                 Positive.Mental.Health
## Sense.of.Belonging   No   Yes Total
##            Strong    860 10752 11612
##            Weak      905  4873  5778
##            Total    1765 15625 17390
```

```r
tally(~ Sense.of.Belonging + Positive.Mental.Health, margin = TRUE, format = "percent", data = CCHS.2)
```

```
##                 Positive.Mental.Health
## Sense.of.Belonging       No       Yes      Total
##            Strong   4.945371 61.828637  66.774008
##            Weak     5.204140 28.021852  33.225992
##            Total   10.149511 89.850489 100.000000
```

Contingency Table for Mental Health and Gender

```r
# Two-way Table using {janitor} package
# data frame
CCHS.2 %>%
  # cross-tabulate counts of two columns
  tabyl(Gender, Positive.Mental.Health) %>%
  # add a total row, add a total column
  adorn_totals(where = c("row", "col")) %>%
  # convert to proportions with row denominator
  adorn_percentages(denominator = "row") %>%
  # convert proportions to percents
  adorn_pct_formatting() %>%
  # display as: "count (percent)"
  adorn_ns(position = "front") %>%
  # adjust titles
  adorn_title(
    row_name = "Gender",
    col_name = "Positive Mental Health") %>%
  # print elegant results for interactive analysis or for sharing in a report
  # e.g., with knitr::kable()
  knitr::kable()
```

	Positive Mental Health		
Gender	No	Yes	Total
Female	1119 (12.5%)	7850 (87.5%)	8969 (100.0%)
Male	646 (7.7%)	7775 (92.3%)	8421 (100.0%)
Total	1765 (10.1%)	15625 (89.9%)	17390 (100.0%)

```r
# Two-way Table using {mosaic} package
tally(~ Gender + Positive.Mental.Health, margin = TRUE, data = CCHS.2)
```

```
##         Positive.Mental.Health
## Gender      No   Yes Total
##    Female 1119  7850  8969
##    Male    646  7775  8421
##    Total  1765 15625 17390
```

```r
tally(~ Gender + Positive.Mental.Health, margin = TRUE, format = "percent", data = CCHS.2)
```

```
##         Positive.Mental.Health
## Gender          No        Yes      Total
##    Female  6.434733  45.140886  51.575618
##    Male    3.714779  44.709603  48.424382
##    Total  10.149511  89.850489 100.000000
```

Bivariate Association: Bar Plots

```
# Bar Plots of Positive Mental Health and Sense of Belonging
bar.plot1 = ggplot(CCHS.2, aes(x = factor(Positive.Mental.Health), fill = factor(Sense.of.Belonging)))
bar.plot1 = bar.plot1 + geom_bar(position = "dodge")
bar.plot1 = bar.plot1 + labs(fill = "Sense of Belonging")
bar.plot1 = bar.plot1 + xlab("Positive Mental Health")
bar.plot1 = bar.plot1 + ylab("Count")

# Bar Plots of Positive Mental Health and Gender
bar.plot2 = ggplot(CCHS.2, aes(x = factor(Positive.Mental.Health), fill = factor(Gender)))
bar.plot2 = bar.plot2 + geom_bar(position = "dodge")
bar.plot2 = bar.plot2 + labs(fill = "Gender")
bar.plot2 = bar.plot2 + xlab("Positive Mental Health")
bar.plot2 = bar.plot2 + ylab("Count")

bar.plot1 + bar.plot2
```
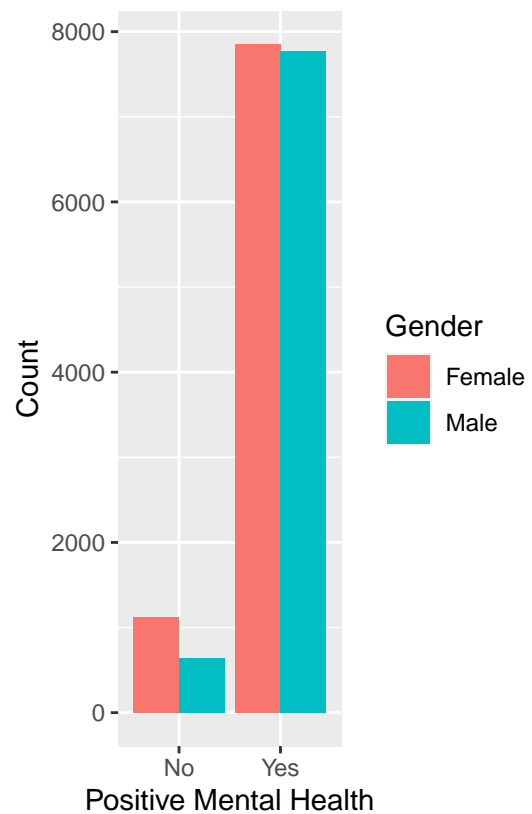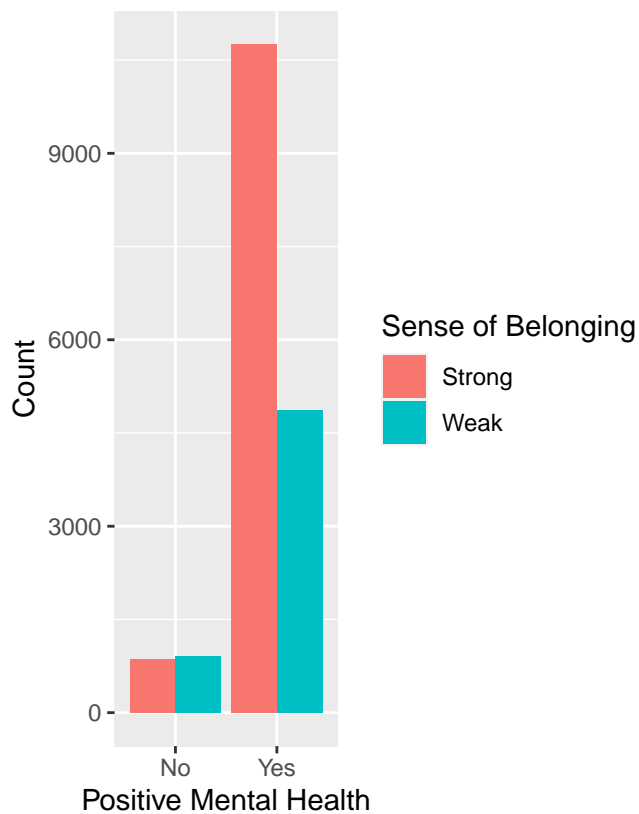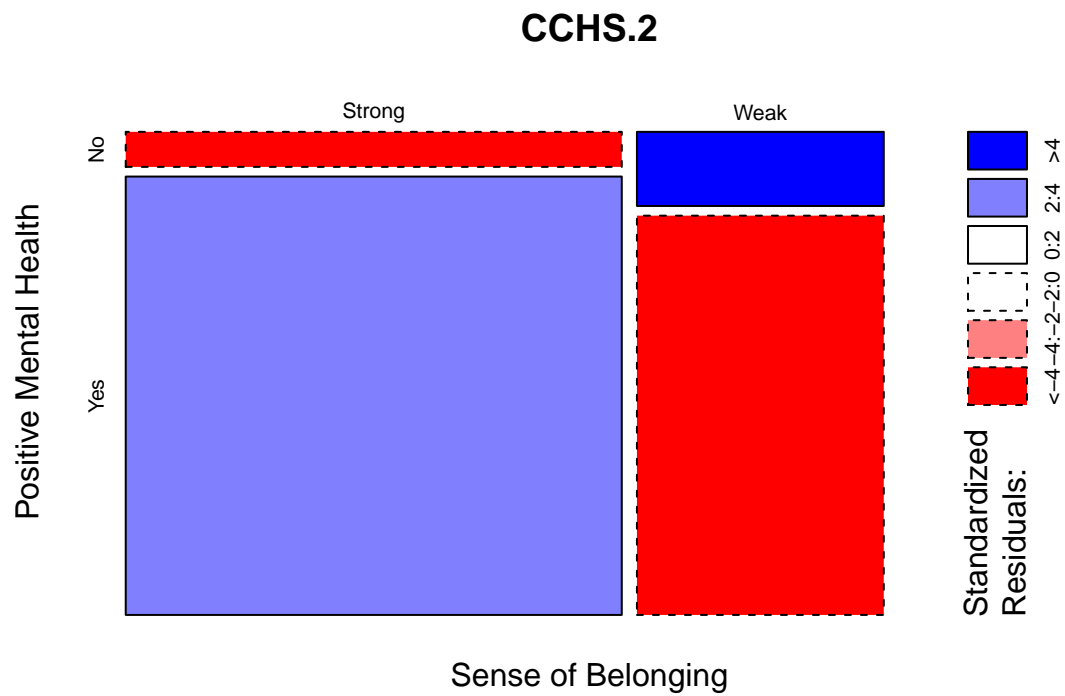
Mosaic Plot 1: Detect Pattern of Association

```
mosaicplot(~ CCHS.2$Sense.of.Belonging + CCHS.2$Positive.Mental.Health,
                       xlab = "Sense of Belonging",
                       ylab = "Positive Mental Health",
                       shade = TRUE, color = TRUE,
                       data = CCHS.2)
```

Mosaic Plot 2: Detect Pattern of Association

```
mosaicplot(~ CCHS.2$Gender + CCHS.2$Positive.Mental.Health,
                      xlab = "Gender",
                      ylab = "Positive Mental Health",
                      shade = TRUE, color = TRUE,
                      data = CCHS.2)
```

CCHS.2
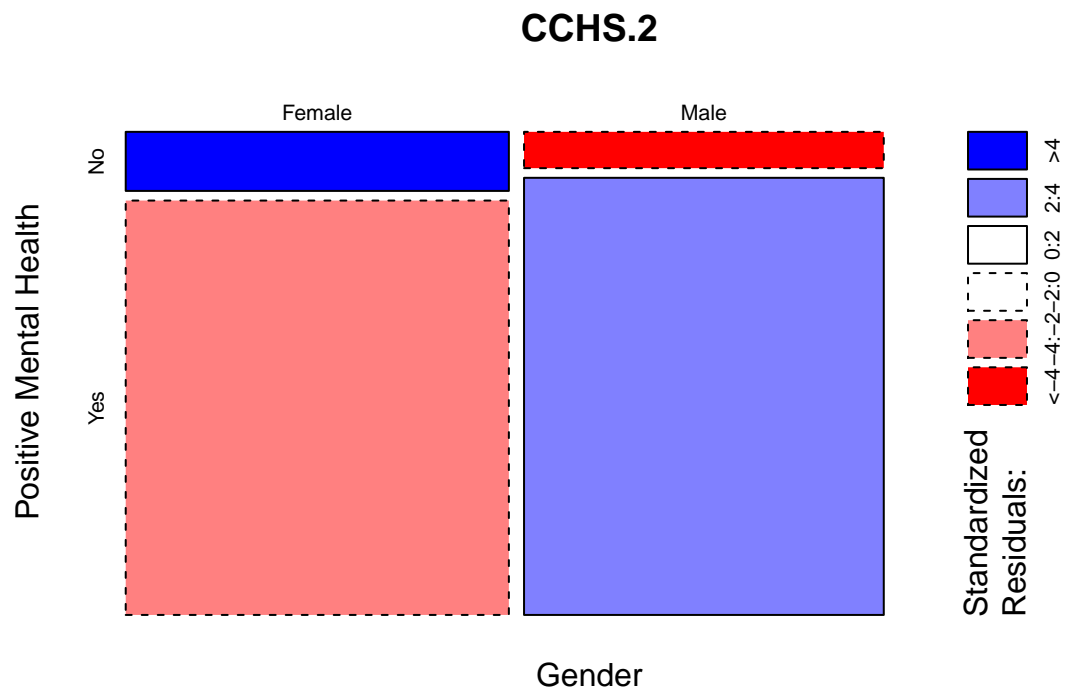
Sense of Belonging	Positive Mental Health		
	No	Yes	Total
Strong	588 (9.6%)	5511 (90.4%)	6099 (100.0%)
Weak	531 (18.5%)	2339 (81.5%)	2870 (100.0%)
Total	1119 (12.5%)	7850 (87.5%)	8969 (100.0%)

Sense of Belonging	Positive Mental Health		
	No	Yes	Total
Strong	272 (4.9%)	5241 (95.1%)	5513 (100.0%)
Weak	374 (12.9%)	2534 (87.1%)	2908 (100.0%)
Total	646 (7.7%)	7775 (92.3%)	8421 (100.0%)

Multivariate Association

```r
# data frame
CCHS.2 %>%
  # cross-tabulate counts of two columns
  tabyl(Sense.of.Belonging, Positive.Mental.Health, Gender) %>%
  # add a total row, add a total column
  adorn_totals(where = c("row", "col")) %>%
  # convert to proportions with row denominator
  adorn_percentages(denominator = "row") %>%
  # convert proportions to percents
  adorn_pct_formatting() %>%
  # display as: "count (percent)"
  adorn_ns(position = "front") %>%
  # adjust titles
  adorn_title(
    row_name = "Sense of Belonging",
    col_name = "Positive Mental Health") %>%
  # print elegant results for interactive analysis or for sharing in a report
  # e.g., with knitr::kable()
  knitr::kable()
```

```
tally(~ Positive.Mental.Health | Sense.of.Belonging + Gender,
      margin = TRUE, data = CCHS.2)
```

```
## , , Gender = Female
##
##                      Sense.of.Belonging
## Positive.Mental.Health Strong Weak
##                   No      588  531
##                   Yes    5511 2339
##                   Total  6099 2870
##
## , , Gender = Male
##
##                      Sense.of.Belonging
## Positive.Mental.Health Strong Weak
##                   No      272  374
##                   Yes    5241 2534
##                   Total  5513 2908
```

```
tally(~ Positive.Mental.Health | Sense.of.Belonging + Gender,
      margin = TRUE, format = "percent", data = CCHS.2)
```

```
## , , Gender = Female
##
##                      Sense.of.Belonging
## Positive.Mental.Health     Strong        Weak
##                   No      9.640925   18.501742
##                   Yes    90.359075   81.498258
##                   Total 100.000000  100.000000
##
## , , Gender = Male
##
##                      Sense.of.Belonging
## Positive.Mental.Health     Strong        Weak
##                   No      4.933793   12.861073
##                   Yes    95.066207   87.138927
##                   Total 100.000000  100.000000
```

```
# Side-by-side Bar Plots: Multivariate Association
bar.plot = ggplot(CCHS.2, aes(x = factor(Positive.Mental.Health), fill = factor(Sense.of.Belonging)))
bar.plot = bar.plot + geom_bar(position = "dodge")
bar.plot = bar.plot + labs(fill = "Sense of Belonging")
bar.plot = bar.plot + xlab("Positive Mental Health")
bar.plot = bar.plot + ggtitle("Bar Plots of Positive Mental Health and Sense of Belonging by Gender")
bar.plot = bar.plot + facet_wrap(~factor(Gender), scales = "free_x")
bar.plot = bar.plot + theme_bw()
bar.plot
```


Bar Plots of Positive Mental Health and Sense of Belonging by Gender