

# Unit 9 Lab Report

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### Section 1: Hypothesis

The goal of this research paper is to determine if regular prayer has any correlation on the opinion of the federal government allowing prayer in school. The following are the hypothesizes examined:

Null: There is no significant correlation between prayer frequency and opinion on prayer in school.  
Research<sub>1</sub>: There will be a significance between prayer frequency and opinion on prayer in schools.

H<sub>0</sub>: Higher prayer frequency  $\neq$  Significance on opinion of prayer in School  
H<sub>1</sub>: Higher prayer frequency = Significance on opinion of prayer in School

### Section 2: Data

The data used for this report is from the Baylor Survey of Religious Life. The answers of participants are encoded as follows:

Question asked or description	Answers
About how much time do you spend praying alone outside of religious services?	0 - Never 1 - On certain occasions 2 - Once a week or less 3 - A few times a week 4 - Once daily 5 - Several times a day
The federal government should allow prayer in public school	1 - Strongly disagree 2 - Disagree 3 - Agree 4 - Strongly agree 8 - Undecided

The preceding data is nominal.

### Section 3: Method

Using RStudio, the data was imported from an excel sheet using the `readxl` package and directed into the variable `Module_9_Lab_Data`. To analyse the data, the function `CrossTable()` was run. It creates a cross tabulation table and runs a chi-squared test.

```
CrossTable(Module_9_Lab_Data$PrayerFreq, Module_9_Lab_Data$PrayerSchool,
            expected = TRUE, dnn = c("Prayer Frequency",
                                     "Prayer in School"),
            format = c("SPSS"))
```

From here, a bar chart of opinions on prayer in school related to prayer habits was created. To do so was a bit of a task.

```
data <- Module_9_Lab_Data

result <- data %>%
  group_by(PrayerFreq, PrayerSchool) %>%
  summarise(Count = n(), .groups = 'drop')

# View the result
print(result, n = 35)
```

To create the graph, prayer habit related to total occurrence of prayer in school opinion has to be calculated. There isn't a completely straightforward way of doing this in R, so I opted to use `summarise` and `print` to find the totals, as seen above. Through this, I learned `%>%` is called the pipe symbol and feeds output to the subsequent function (essentially doing what `<-` does backwards).

Then came the tedious part. I transcribed the amount of occurrences by hand to a `data.frame` capable of displaying the data in the graph. I'm not entirely certain why I had to use `rep()` on my `Habit` variable, other than RStudio threw an error saying that lengths between response and habit must be identical.

```
# Data
data <- data.frame(
  Habit = rep(paste("Habit", 0:5), each = 5),
```

```

Response = rep(c("Strongly Disagree", "Disagree",
                 "Agree", "Strongly Agree", "Undecided"), times = 6),
Count = c(117, 46, 39, 7, 15,   # Habit 0
          41, 56, 98, 35, 26,   # Habit 1
          9, 13, 40, 13, 9,     # Habit 2
          14, 26, 83, 55, 14,   # Habit 3
          17, 25, 108, 97, 20,  # Habit 4
          17, 26, 112, 198, 19) # Habit 5
)

```

Finally, here's the graph code, with one quick add-on: originally, the responses were displayed without a logical order. They had to be manually coerced to display in the order desired using a `factor()`.

```

# Reordering Response levels
data$Response <- factor(data$Response,
                        levels = c("Undecided", "Strongly Disagree",
                                   "Disagree", "Agree",
                                   "Strongly Agree"))

# Create the plot
ggplot(data, aes(x = Response, y = Count, fill = Response)) +
  geom_bar(stat = "identity") +
  facet_wrap(~ Habit, scales = "free_y") +
  labs(
    title = "Survey Responses for Prayer Habits",
    x = "Prayer should be allowed in public schools",
    y = "Count") +
  theme(
    axis.text.x = element_blank()
  ) +
  scale_fill_manual(values = c("#787878", "#ff1100",
                               "#ff6961", "#92ff8c", "#0dff00"))

```

Note that the y-axis are *intentionally* different in each graph in figure 1. This is to better illustrate relationships in the graphs rather than just raw numbers. Figure 2 offers an un-adjusted view for better transparency on raw numbers.

## Section 4: Results

The results from `CrossTable()` can be viewed in full in figure 3. As for the results of the Chi-squared test (fig. 4), it returns a p-value of 1.06E-89, well into statistical significance. This is further demonstrated in figure 1.

## Section 5: Discussion and Conclusion

From these results, it's clear that prayer frequency has a direct and measurable impact on opinion regarding the allowance of prayer by the federal government in schools.

It stands to reason the null is rejected and  $H_1$  is accepted.

## Section 6: Graphics and Visuals

*Note formatting in this section is weird due to figure sizes.*

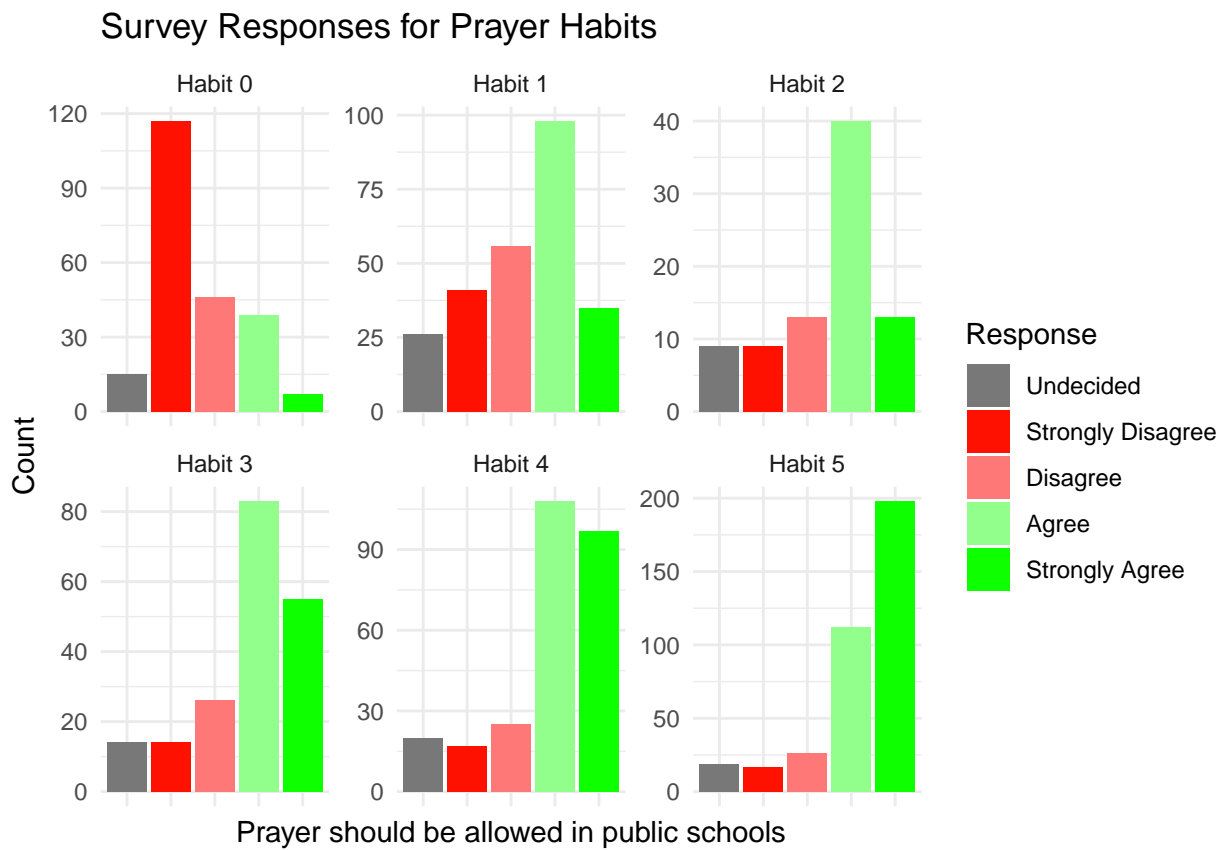


Figure 1: Bar graph with adjusted Y-value. Opinion on prayer in public school based upon prayer habit.

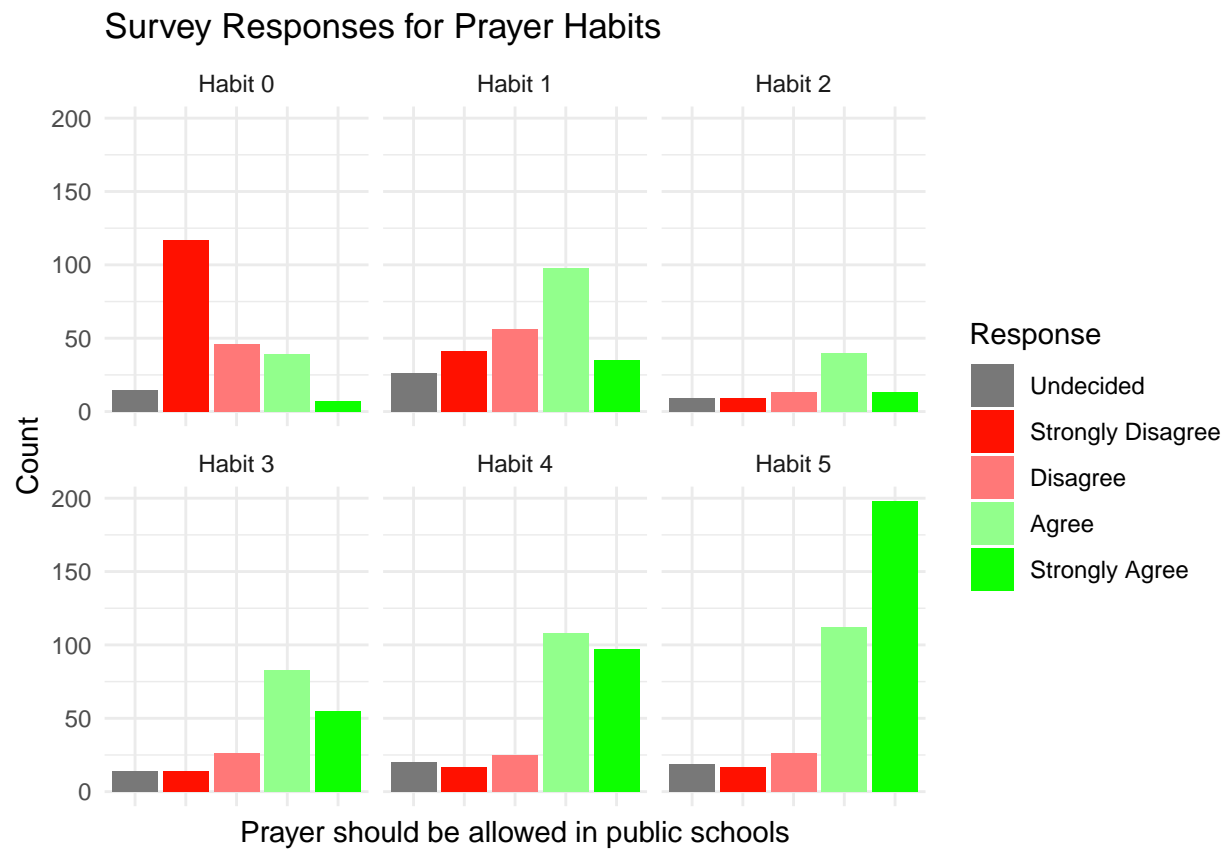


Figure 2: Bar graph with non-adjusted Y-value. Opinion on prayer in public school based upon prayer habit.

Prayer Opinion:	1	2	3	4	8	
Prayer Frequency						Row Total
0	117 34.523 197.038 52.232% 54.419% 8.387%	46 30.830 7.464 20.536% 23.958% 3.297%	39 77.075 18.809 17.411% 8.125% 2.796%	7 65.032 51.786 3.125% 1.728% 0.502%	15 16.539 0.143 6.696% 14.563% 1.075%	224   16.057%
1	41 39.455 0.060 16.016% 19.070% 2.939%	56 35.234 12.238 21.875% 29.167% 4.014%	98 88.086 1.116 38.281% 20.417% 7.025%	35 74.323 20.805 13.672% 8.642% 2.509%	26 18.902 2.666 10.156% 25.243% 1.864%	256   18.351%
2	9 12.946 1.203 10.714% 4.186% 0.645%	13 11.561 0.179 15.476% 6.771% 0.932%	40 28.903 4.260 47.619% 8.333% 2.867%	13 24.387 5.317 15.476% 3.210% 0.932%	9 6.202 1.262 10.714% 8.738% 0.645%	84   6.022%
3	14 29.591 8.215 7.292% 6.512% 1.004%	26 26.426 0.007 13.542% 13.542% 1.864%	83 66.065 4.341 43.229% 17.292% 5.950%	55 55.742 0.010 28.646% 13.580% 3.943%	14 14.176 0.002 7.292% 13.592% 1.004%	192   13.763%
4	17 41.151 14.174 6.367% 7.907% 1.219%	25 36.748 3.756 9.363% 13.021% 1.792%	108 91.871 2.832 40.449% 22.500% 7.742%	97 77.516 4.897 36.330% 23.951% 6.953%	20 19.714 0.004 7.491% 19.417% 1.434%	267   19.140%
5	17 57.333 28.374 4.570% 7.907% 1.219%	26 51.200 12.403 6.989% 13.542% 1.864%	112 128.000 2.000 30.108% 23.333% 8.029%	198 108.000 75.000 53.226% 48.889% 14.194%	19 27.467 2.610 5.108% 18.447% 1.362%	372   26.667%
Column Total	215 15.412%	192 13.763%	480 34.409%	405 29.032%	103 7.384%	1395

Total Observations in Table: 1395

Figure 3. Cross tabulation table. See appendix for key.

Pearson's Chi-squared test		
Chi <sup>2</sup> = 482.9719	d.f. = 20	p = 1.063345e-89

Figure 4. Chart. Pearson's chi-squared test.

## Section 7: Appendix

Cell Contents Key for cross tabulation table
Count
Expected Values
Chi-square contribution
Row Percent
Column Percent
Total Percent