

# Unit 10 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.

$H_0: \rho_{xy} = 0$

$H_1: r_{xy} \neq 0$

## Section 2: Data

The data being utilized is from the Baylor Survey of Religious Life. Participants were asked to respond with their age and the bracket to which their income falls within. The following code book was used:

Question or Description	Possible Answers
Age range of people who pray once or several times a day as reported in 2017.	Range: 17-95
By your best estimate, what was your total household income last year, before taxes?	1) \$10,000 or less 2) \$10,001 to \$20,000 3) \$20,001 to \$35,000 4) \$35,001 to \$50,000 5) \$50,001 to \$100,000 6) \$100,001 to \$150,000 7) \$150,001 or more

## Section 3: Method

To evaluate the data, Pearson's  $r$  was calculated using `rcorr`, a function which evaluates Pearson's  $r$  and the associated P-value. The data needed to be coerced into a matrix to allow calculation of each variable. The other option that exists is to create two separate data frames for each variable.

```
rcorr(as.matrix(Module_10_Lab_Data), type = "pearson")
```

To determine  $R^2$ , I took a function off the internet to create a function for evaluating  $R^2$ . The original function required you to coerce the variables to be matrices, so I put it in the function to avoid this.

```
rsq <- function (x, y) cor(as.matrix(x), as.matrix(y)) ^ 2  
  
rsq(Module_10_Lab_Data, Module_10_Lab_Data)
```

Lastly, `ggplot2` was used to produce a scatter plot. This was achieved through the `geom_point()`, while `geom_smooth()` was used to create the trend line.

```
graphdata <- as.data.frame(Module_10_Lab_Data)  
  
ggplot(data = graphdata, aes(x = Age, y = `Income Interval`)) +  
  geom_point(shape = 18, color = "black") +  
  geom_smooth(method = lm, color = "#f21f1f") +  
  xlim(0, 100) +  
  ylim(0, 8) +  
  theme_bw()
```

## 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

```
##           Age Income Interval
## Age           1.00          -0.11
## Income Interval -0.11          1.00
##
## n= 584
##
##
## P
##           Age   Income Interval
## Age           0.0055
## Income Interval 0.0055

## `geom_smooth()`` using formula = 'y ~ x'
```

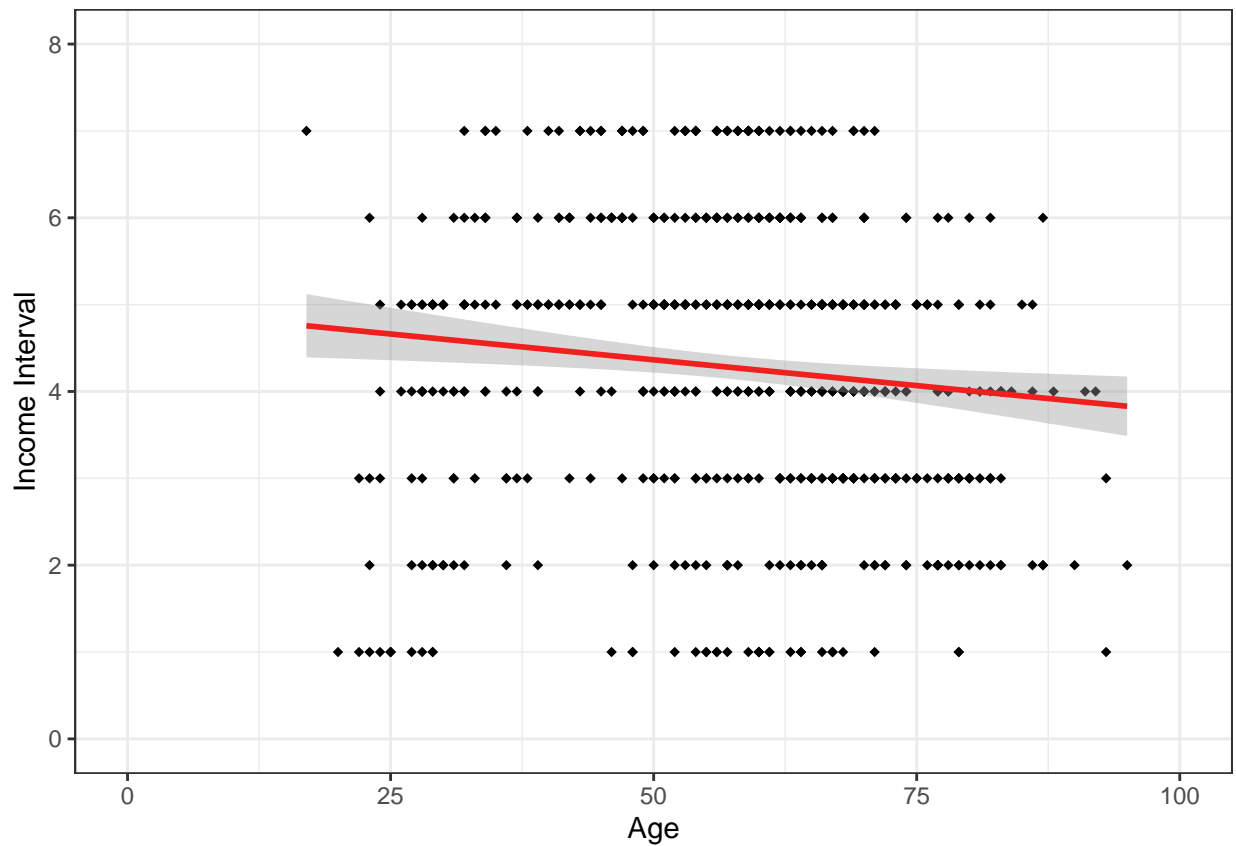


Figure 1: Scatter plot with trend line. Age and income of respondents.