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Web address for GitHub repository

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1 Rationale and Research Questions

1.1 Research Questions

1. (a) When consumers buy seafood, which species do they prefer? (b) Do they prefer wild or farmed fish?

2. (a) What qualities do consumers associate with wild vs. farmed seafood? (b) What qualities do they value in seafood?

3. Are seafood values predicted by demographic variables such as age or education level?

2 Dataset Information

2.1 Description of the Data

Our data were obtained from a social science survey conducted by a multi-university team of researchers, including the Murray lab at Duke University. The survey was conducted in the summer of 2020 via Qualtrics and targeted North Carolina residents from across the state.

The survey asked respondents a total of 37 questions. The question topics can be broken down into the following categories: eating habits for 8 types of seafood, what qualities respondents associate with seafood, attitudes about mariculture, attitudes about North Carolina seafood versus commercial fishing, respondents' involvement with seafood production, and demographic indicators. This study focuses on questions about eating habits, what qualities are associated with seafood, and demographic indicators.

Respondents answered each question by selecting one option from a menu of choices; the number of choices available depended on the question. The dataset contained responses from 1436 participants.

2.2 Data Wrangling

For each analysis, we created a new dataset containing only the relevant columns. For each category within the survey question, we then created a table with the frequency of each questions response. For example, one question asked respondents to rate how often they ate each of 8 types of seafood; respondents could choose from 7 responses for each seafood type. To wrangle this data, we created a dataframe for each type of seafood, for a total of 8 dataframes, each of which contained a column with the response choices and a column with the number of respondents that chose each response. Because the response choices were only represented by a number in the raw data, we renamed the response column with the meaning of each number for greater clarity. We repeated this process for the first two research questions (how often participants eat each type of seafood, whether participants prefer each type wild or farmed, whether participants associate each quality with wild or farmed seafood).

For the third research question, we created a dataframe with responses to a question about how important each of 11 qualities was when respondents were buying seafood. We then renamed the columns and removed rows with alternate responses to demographic variables, such as "prefer not to answer."

2.3 Data Structure: Consumer preferences

****Data from these responses are categorical, but the response choices could be situated along a linear scale, allowing us to analyze response means.

Research Question	Survey Question	Response choices
1a. When consumers buy seafood, which species do they prefer?	In the past year, how often did you eat the following type of seafood**?	0 = Never, 1 = Once in the past year, 2 = A few times in the past year, 3 = Once a month, 4 = A few times every month, 5 = Once a week, 6 = More than once a week
1b. Do consumers prefer wild or farmed fish?	Between wild-caught and farmed versions of the same seafood species**, which do you prefer to eat?	1 = Strongly prefer wild-caught, 2 = Slightly prefer wild-caught, 3 = No preference, 4 = Slightly prefer farmed, 5 = Strongly prefer farmed, 6 = I don't know
2a. What qualities do consumers associate with wild vs. farmed seafood?	How do you associate the following qualities*** with different types of seafood (farmed and wild-caught)?	1 = More associated with wild-caught, 2 = Associated equally with wild-caught and farmed, 3 = More associated with farmed, 4 = Associated with neither wild-caught or farmed, 5 = I don't know
2b. What qualities do consumers value in seafood?	When you are buying seafood, how important are the following qualities*** to you?	1 = Not at all important, 2 = Slightly important, 3 = Moderately important, 4 = Very important, 5 = Extremely important

** Seafood types: Tuna, Shrimp, Salmon, Flounder, Blue Crab, Clams, Mullet, Oysters (8)

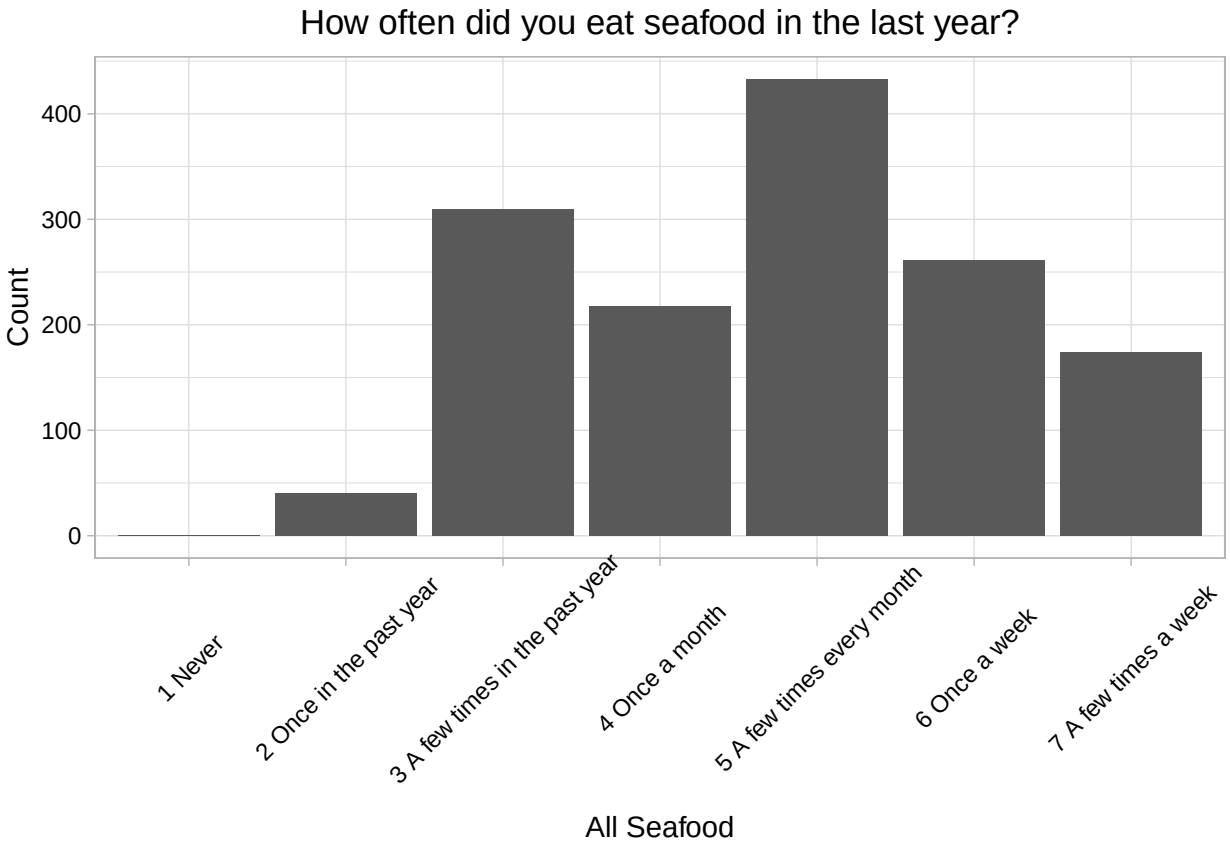
*** Qualities: Healthy, Local, Safe, Tasty, Affordable, Sustainable, Fresh, Easy Access, Local Culture, Local Economies, Local Environment (11)

2.4 Data structure: Demographics

Demographic Category	Response choices	Counts
Age	1=19 or younger	74
.	2=20-29	201
.	3=30-39	170
.	4=40-49	159
.	5=50-59	156
.	6=60-69	172
.	7=70 or older	100
.	8=Prefer not to answer	8
Education level	1=Less than high school	35
.	2=High school graduate	229
.	3=Some college	302
.	4=2 year degree	167
.	5=4 year degree	382
.	6=Professional degree	260
.	7=Doctorate	49
.	8=Prefer not to answer	12
Political party	1=Republican	449
.	2=Democrat	459
.	3=Independent	384
.	4=Other	28
.	5=Prefer not to answer	116

3 Exploratory Analysis

[explanatory text]



freq.general mean = 4.76

- map of counties where respondents live?

4 Analysis

4.1 Question 1a: When consumers buy seafood, which species do they prefer?

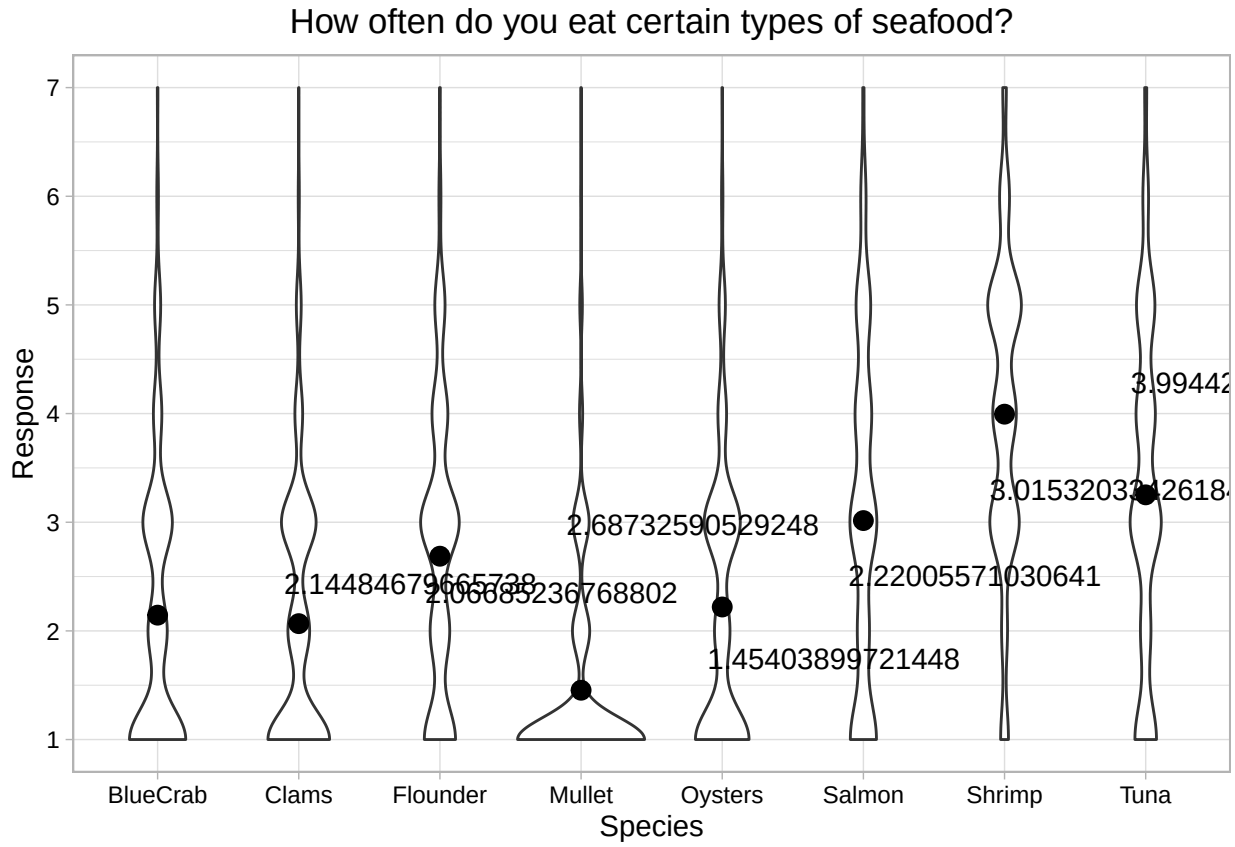
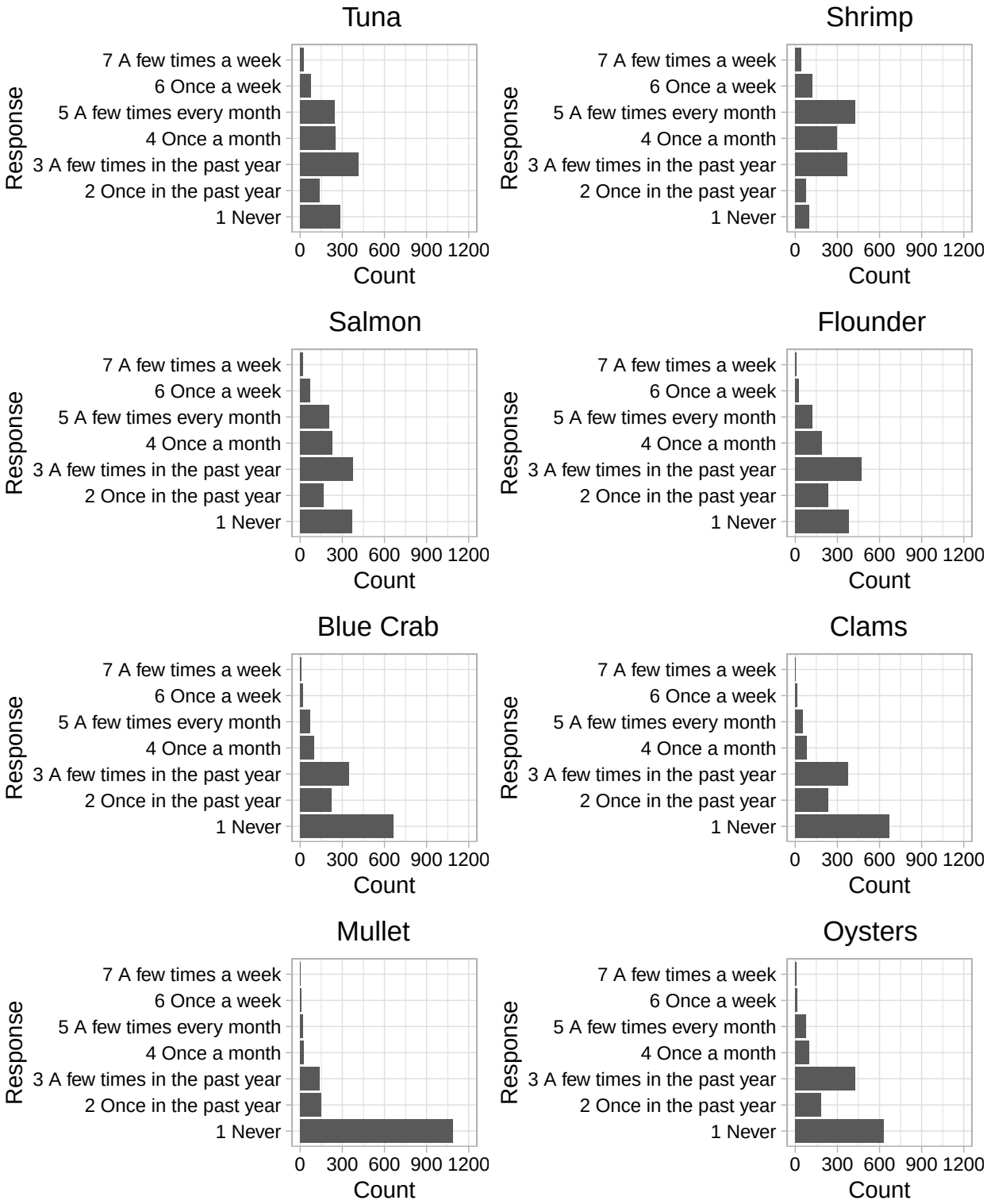


Figure 1: Violin plot and means of the frequency of seafood consumption based on type

Based on this analysis, it appears as though respondents tended to eat shrimp more than the other species and tended to eat mullet less than the other species. However, the manner in which the chart conveys the information masks some of the detail. With that in mind, we explore other means of rendering the data.



This revised means of conveying the data does a much clearer job of showing that respondents tend to eat Shrimp, Tuna, and Salmon more often than they eat the other species. Respondents overwhelmingly never eat Mullet. Respondents seem to eat Blue Crab, Clams, and Oysters very infrequently if ever. However, this information is still pulled apart by

frequency. The below visualization simplifies the data even further, capturing the number of respondents who ever consume each species.

[explanation etc]

4.1.1 Question 1b: Do consumers prefer wild or farmed fish?

On the whole, respondents seem to have some degree of preference for wild caught seafood or don't have any preference between wild caught and farmed seafood. However, very few respondents identified any degree of preference for farmed fish.

The species-specific barplots do a clear job of showing that the preference trends remain relatively uniform across all species but with a couple interesting points. For those species that respondents said they consumed less often, Mullet and Blue Crab, respondents showed a larger "stronger preference for wild caught." Meanwhile, for those species that respondents said they consumed more often, Tuna, Shrimp, and Salmon, respondents identified "no preference" between farmed and wild-caught a little more readily.

4.2 Question 2a: What qualities do consumers associate with seafood?

There is quite the spread in associations of particular qualities with farmed or wild-caught seafood. Given this spread and the challenges with parsing apart the data in this format, we explore a different way of visualizing data below.

This means of rendering the data shows that folks tend to associate tasty, fresh, safe, healthy, and the various local categories more heavily with wild-caught seafood. However, respondents tent to associate sustainability, easy access, and affordability more heavily with farmed seafood.

4.3 Question 2b: What qualities do consumers value in seafood?

Here, we can see that respondents prioritized certain qualities like safety, tastiness, freshness, and healthiness of the seafood but didn't seem to place as much emphasis on other qualities like whether the seafood was farmed or wild.

4.4 Question 3: Are valued seafood qualities predicted by demographic variables such as age or education level?

Fresh tasty healthy local - qualities most associated with wild

```
##
## Call:
```

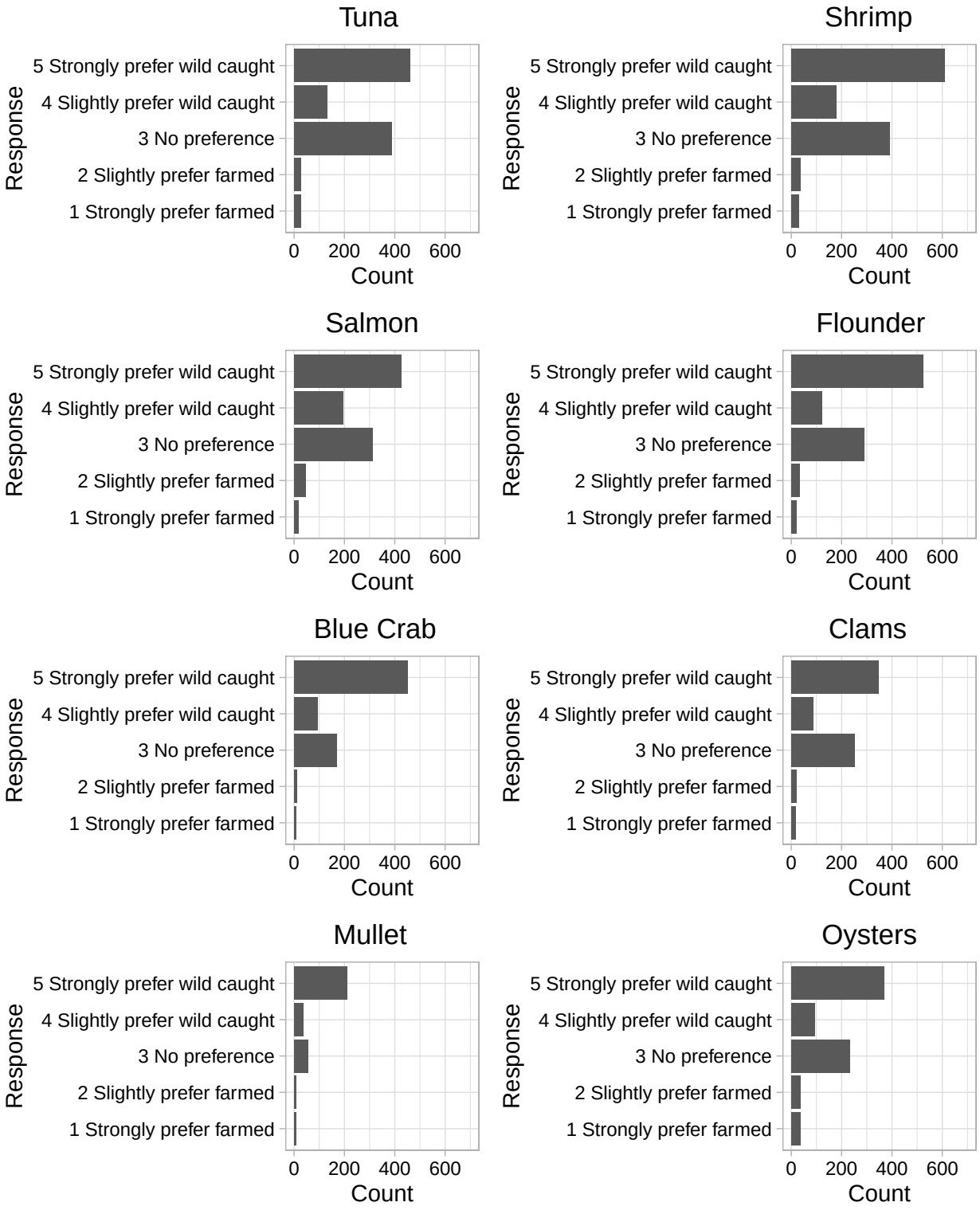


Figure 2: Do you prefer wild-caught or farmed versions of these seafood?

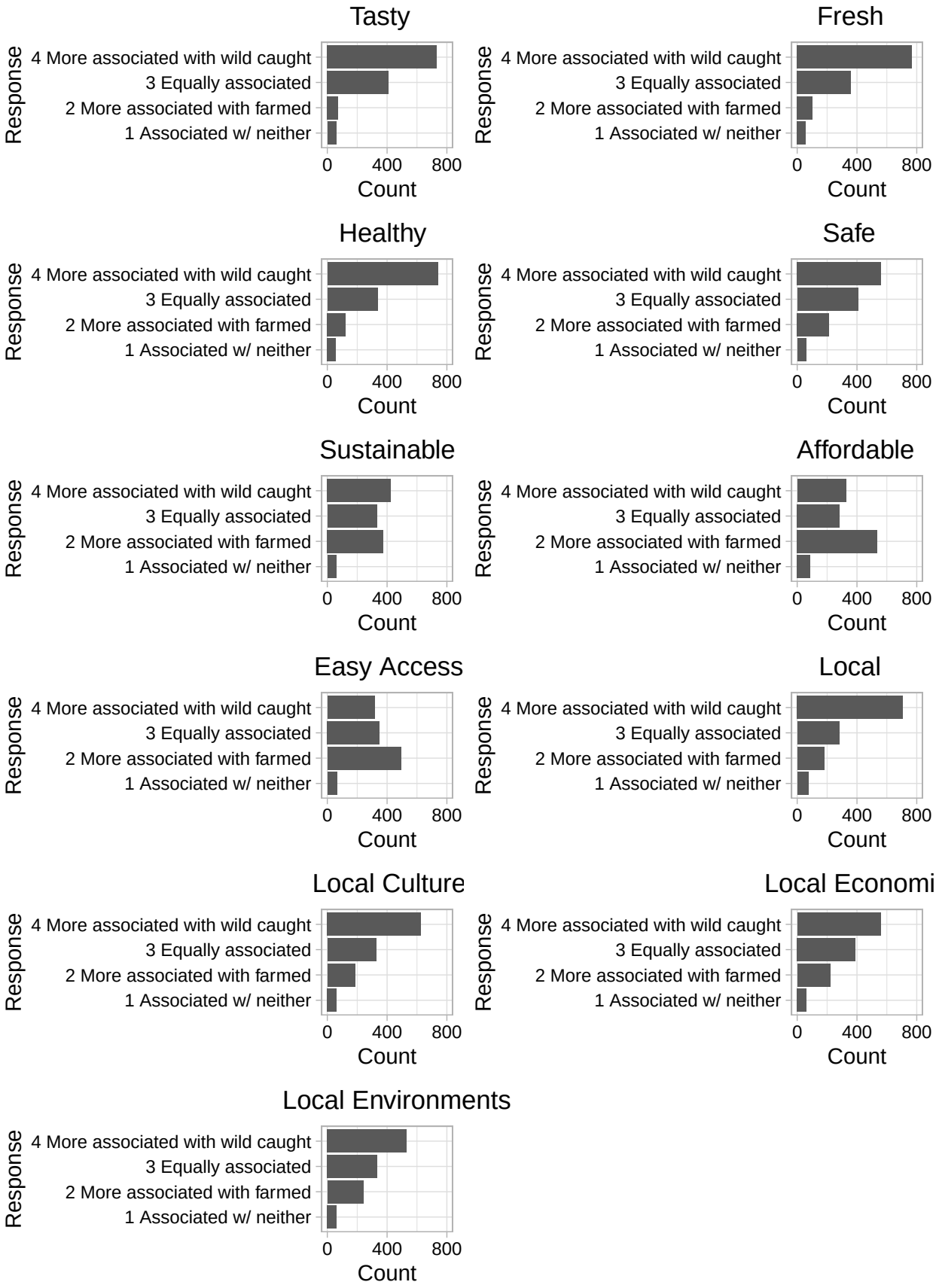


Figure 3: How do you associate the following qualities with wild vs. farmed seafood?

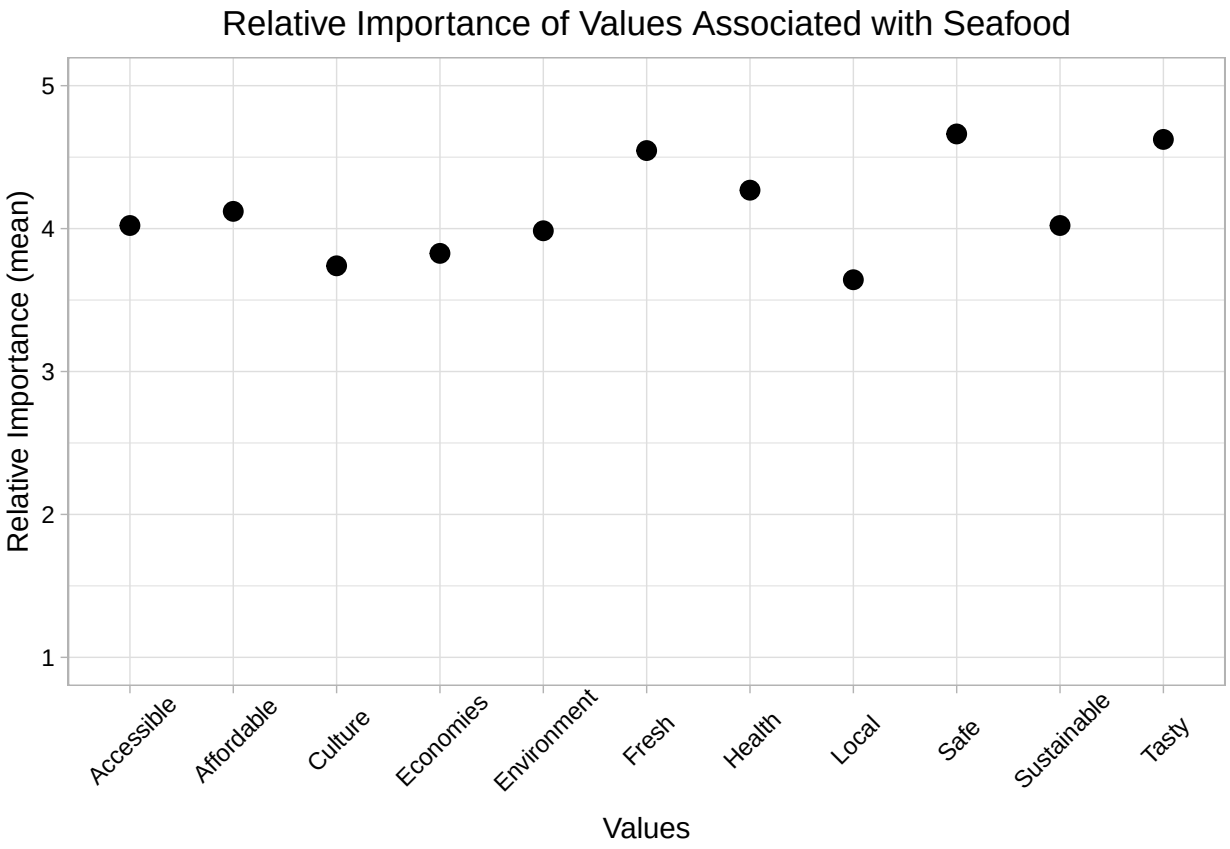


Figure 4: How important are the following qualities?

```
## lm(formula = Fresh ~ Age, data = demo.age)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -3.6105 -0.5300  0.4151  0.4700  1.0000
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  4.00000    0.09923  40.311  < 2e-16 ***
## Age2         0.34826    0.11607   3.001  0.00276 **
## Age3         0.34118    0.11888   2.870  0.00419 **
## Age4         0.58491    0.12012   4.869 1.30e-06 ***
## Age5         0.55128    0.12049   4.575 5.33e-06 ***
## Age6         0.61047    0.11867   5.144 3.22e-07 ***
## Age7         0.53000    0.13089   4.049 5.53e-05 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.8536 on 1025 degrees of freedom
## Multiple R-squared:  0.03693,    Adjusted R-squared:  0.0313
## F-statistic: 6.551 on 6 and 1025 DF,  p-value: 8.386e-07

##
## Call:
## lm(formula = Fresh ~ Education, data = demo.ed)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -3.6808 -0.5331  0.4215  0.4669  0.9143
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)   4.0857     0.1330  30.730  < 2e-16 ***
## Education2    0.3029     0.1428   2.122 0.034006 *
## Education3    0.4474     0.1404   3.186 0.001477 **
## Education4    0.4772     0.1462   3.263 0.001128 **
## Education5    0.4928     0.1389   3.548 0.000401 ***
## Education6    0.5951     0.1416   4.202 2.81e-05 ***
## Education7    0.5265     0.1741   3.025 0.002534 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.7866 on 1417 degrees of freedom
## Multiple R-squared:  0.02069,    Adjusted R-squared:  0.01654
## F-statistic: 4.989 on 6 and 1417 DF,  p-value: 4.553e-05
```

```
##
## Call:
## lm(formula = Fresh ~ Political_Party, data = demo.party)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -3.6125 -0.5730  0.3875  0.4270  0.4270
##
## Coefficients:
##                  Estimate Std. Error t value Pr(>|t|)
## (Intercept)       4.61247    0.03488 132.243   <2e-16 ***
## Political_Party2 -0.03949    0.04906  -0.805    0.421
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.7391 on 906 degrees of freedom
## Multiple R-squared:  0.0007146,  Adjusted R-squared:  -0.0003883
## F-statistic: 0.6479 on 1 and 906 DF,  p-value: 0.4211


##
## Call:
## lm(formula = Local ~ Age, data = demo.age)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -2.6164 -0.6163 -0.2289  0.7711  1.8649
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  3.13514    0.14044  22.324  < 2e-16 ***
## Age2         0.09372    0.16427   0.571  0.56845
## Age3         0.12957    0.16825   0.770  0.44142
## Age4         0.48122    0.17001   2.831  0.00474 **
## Age5         0.37769    0.17053   2.215  0.02699 *
## Age6         0.37068    0.16796   2.207  0.02753 *
## Age7         0.12486    0.18525   0.674  0.50045
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.208 on 1025 degrees of freedom
## Multiple R-squared:  0.01778,    Adjusted R-squared:  0.01203
## F-statistic: 3.093 on 6 and 1025 DF,  p-value: 0.005248


##
```

```
## Call:
## lm(formula = Local ~ Education, data = demo.ed)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -2.8846 -0.6911  0.3089  1.1154  1.5714
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  3.42857    0.20118  17.042   <2e-16 ***
## Education2   0.07361    0.21601   0.341   0.7333
## Education3   0.11447    0.21252   0.539   0.5902
## Education4   0.08041    0.22126   0.363   0.7163
## Education5   0.26253    0.21019   1.249   0.2119
## Education6   0.45604    0.21429   2.128   0.0335 *
## Education7   0.40816    0.26341   1.550   0.1215
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.19 on 1417 degrees of freedom
## Multiple R-squared:  0.01476,    Adjusted R-squared:  0.01059
## F-statistic: 3.537 on 6 and 1417 DF,  p-value: 0.001762


##
## Call:
## lm(formula = Local ~ Political_Party, data = demo.party)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -2.7734 -0.7734  0.2266  1.2266  1.3185
##
## Coefficients:
##                  Estimate Std. Error t value Pr(>|t|)
## (Intercept)       3.68151    0.05561  66.205   <2e-16 ***
## Political_Party2  0.09191    0.07821   1.175     0.24
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.178 on 906 degrees of freedom
## Multiple R-squared:  0.001522,   Adjusted R-squared:  0.0004197
## F-statistic: 1.381 on 1 and 906 DF,  p-value: 0.2403


##
## Call:
```

```
## lm(formula = Tasty ~ Age, data = demo.age)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -3.6667 -0.4677  0.3430  0.4647  0.5676
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  4.43243    0.08570  51.722   <2e-16 ***
## Age2         0.03523    0.10024   0.351   0.7253
## Age3         0.10286    0.10267   1.002   0.3166
## Age4         0.19021    0.10374   1.834   0.0670 .
## Age5         0.23423    0.10406   2.251   0.0246 *
## Age6         0.22454    0.10249   2.191   0.0287 *
## Age7         0.24757    0.11304   2.190   0.0287 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.7372 on 1025 degrees of freedom
## Multiple R-squared:  0.01409,    Adjusted R-squared:  0.008321
## F-statistic: 2.442 on 6 and 1025 DF,  p-value: 0.02383

##
## Call:
## lm(formula = Tasty ~ Education, data = demo.ed)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -3.6615 -0.6122  0.3403  0.3444  0.7143
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)   4.2857     0.1145  37.426  < 2e-16 ***
## Education2    0.2645     0.1230   2.151  0.03162 *
## Education3    0.3699     0.1210   3.058  0.00227 **
## Education4    0.3490     0.1259   2.771  0.00566 **
## Education5    0.3740     0.1196   3.126  0.00181 **
## Education6    0.3758     0.1220   3.081  0.00210 **
## Education7    0.3265     0.1499   2.178  0.02958 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.6775 on 1417 degrees of freedom
## Multiple R-squared:  0.009764,   Adjusted R-squared:  0.005571
## F-statistic: 2.329 on 6 and 1417 DF,  p-value: 0.03051
```

```
##
## Call:
## lm(formula = Tasty ~ Political_Party, data = demo.party)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -3.6904 -0.6275  0.3096  0.3725  0.3725
##
## Coefficients:
##                  Estimate Std. Error t value Pr(>|t|)
## (Intercept)       4.69042    0.02980 157.394   <2e-16 ***
## Political_Party2 -0.06297    0.04191  -1.502    0.133
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.6315 on 906 degrees of freedom
## Multiple R-squared:  0.002485,   Adjusted R-squared:  0.001384
## F-statistic: 2.257 on 1 and 906 DF,  p-value: 0.1333


##
## Call:
## lm(formula = Health ~ Age, data = demo.age)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -3.3372 -0.3372 -0.0882  0.7610  0.9865
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  4.01351    0.11050  36.321   <2e-16 ***
## Age2         0.14569    0.12925   1.127   0.2599
## Age3         0.07472    0.13239   0.564   0.5726
## Age4         0.22548    0.13377   1.686   0.0922 .
## Age5         0.27495    0.13418   2.049   0.0407 *
## Age6         0.32370    0.13215   2.449   0.0145 *
## Age7         0.24649    0.14576   1.691   0.0911 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.9506 on 1025 degrees of freedom
## Multiple R-squared:  0.0107, Adjusted R-squared:  0.004912
## F-statistic: 1.848 on 6 and 1025 DF,  p-value: 0.0868


##
```

```
## Call:
## lm(formula = Health ~ Education, data = demo.ed)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -3.3500 -0.3477  0.6500  0.7120  1.2000
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)   3.8000     0.1537  24.723  < 2e-16 ***
## Education2    0.3528     0.1650   2.138 0.032685 *
## Education3    0.5477     0.1624   3.373 0.000763 ***
## Education4    0.4335     0.1690   2.565 0.010431 *
## Education5    0.4880     0.1606   3.039 0.002421 **
## Education6    0.5500     0.1637   3.359 0.000802 ***
## Education7    0.4245     0.2012   2.109 0.035090 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.9093 on 1417 degrees of freedom
## Multiple R-squared:  0.01248,    Adjusted R-squared:  0.008299
## F-statistic: 2.985 on 6 and 1417 DF,  p-value: 0.006693


##
## Call:
## lm(formula = Health ~ Political_Party, data = demo.party)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -3.3486 -0.3486  0.6514  0.6514  0.6882
##
## Coefficients:
##                  Estimate Std. Error t value Pr(>|t|)
## (Intercept)       4.31180    0.03962  108.83   <2e-16 ***
## Political_Party2  0.03678    0.05573    0.66    0.509
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.8395 on 906 degrees of freedom
## Multiple R-squared:  0.0004806,  Adjusted R-squared:  -0.0006226
## F-statistic: 0.4356 on 1 and 906 DF,  p-value: 0.5094
```

5 Summary and Conclusions

6 References

<add references here if relevant, otherwise delete this section>