Group exercise 1: Survey research

DATA5207: Data Analysis in the Social Sciences

Emily Wong and Sarah Sweeting

Lab 1: Creating Predictors

Introduction

In this study, data from The World Value Survey will be explored to explain quality of life. Part 1 will explore potential predictors to predict higher/lower quality of life with supported theory. Part 2 will tests these predictors through the creation of a dependent variable and predictive models.

Understanding survey data

```
survey.data <- read.csv("wvs_data.csv")
```

Chosen Predictors

Quality of life is difficult to quantify and can be affected by numerous factors in ones life. Another issue is that 'quality' for an individual could be determined by numerous things such as satisfaction, health and wealth.

To help guide our choices of predictors, we will use the World Health Organisations definition of quality of life (QoL) as an "individuals' perceptions of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns".

[https://www.who.int/tools/whoqol]

We believe the factors that affect an indiviudal's perception of life spans further than physical health and wellbeing (however this is obviously also a factor to consider), it can include psychological, environmental, societal and spiritual factors.

Employment - as means of wealth Q279: Are you employed now or not? If yes, about how many hours a week do you work? If you have more than one job, please tell us about your main job only.

Education - as means of standard of living Q275: What is your highest educational level that you have attained?

Security Q131: how secure do you feel these days?

Human Rights Q253: How much respect is there for individual human rights nowadays in this country? Do you feel there is...

Health Levels Q53: "In the last 12 months, how often have you or your family gone without medicine or medical treatment that you needed?

Social & Personal Connectivity Q2. For each of the following, indicate how important it is in your life. How important is… Family, Friends

Theory

Education and employment: When an individual has higher educational attainments and are employed, they are able to have a better quality of life. This is due to higher economic well being and financial security to meet basic needs such as healthcare access and participating in leisure activites. It also can lead to a greater sense of purpose and personal development.

Confounding factor here may be income, since these factors are indicators of what sort of job an individual has an how much they are getting paid as a result (higher education levels = greater income, more hours in employment = higher income)

Security: When an individual is able to live without fear or risk and feels stable, their quality of life will increase. Security can be an impact on the quality of life as it is a measure of both physical safety and economic safety, physical safety affecting individuals health and mental well being, while as economic security to have social safety net to tackle financial challenges and access basic needs.

Human rights: When society upholds and protects human rights, individuals tend to experience better QoL. It is a basic need but also a measure of psychological well-being because of its ability to foster belonging within communities and equality within a just society. It also could promote quality of opportunity, a fair chance for success in society. can you add a blurb for health levels and social and personal connectivity

Health Levels: Health is a foundational element of quality of life. Good health enables individuals to engage actively in various aspects of life including work, social interactions, and leisure activities, thus directly influencing their overall life satisfaction and well-being. Therefore, having a lack of access to necessary medical intervention can lead to decreased physical capabilities, psychological stress, and financial burdens, all of which negatively affect one's quality of life.

Social & Personal Connectivity: Human beings are inherently social creatures, and the quality of our social interactions can significantly impact our mental and emotional well-being. Strong connections with family and friends provide emotional support, reduce stress, and contribute to a sense of belonging and happiness. Furthermore, placing value in personal relationships can influence one's self-esteem and provide opportunities for meaningful engagement in community activities, thereby enhancing an individual's overall quality of life.

Exploring Predictors

```
glimpse(colnames(survey.data))
```

```
##  chr [1:317] "ID" "Mode" "State" "V1" "V2" "V3" "V4" "V5" "V6" "V7" "V8" ...
```

The column names aren't entirely that helpful. We re-code them for convenience.

```
categories = c("Employment", "Education", "Security", "Human Rights", "Treatment Levels",  "Friendship
questions = c("Q279", "Q275", "Q131", "Q253", "Q53", "Q2")
key = c("V249", "Q275", "V170", "V142", "V190", "V5")
```

```
v249_employment_status <- c(
  "No answer",
  "Full time employee (30 hours a week or more)",
  "Part time employee (less than 30 hours a week)",
  "Self-employed",
  "Retired / On a pension",
  "Home duties, not otherwise employed",
  "Student",
  "Unemployed",
  "Other (please specify)"
```

```
)

values.249 = c(-2,1,2,3,4,5,6,7,8)

q275_education = c("No answer",
"No formal education",
"Primary education only",
"Lower secondary education (i.e. Year 9 or less)",
"Upper secondary education (i.e. between Year 10 and Year 12)",
"Post-secondary non-tertiary education (e.g. apprenticeship or certificate)",
"Bachelor or equivalent",
"Master or equivalent",
"Doctoral or equivalent")

values.275 = c(-2,1,2,3,4,5,7,8,9)

v170_how_secure_are_you = c(
"No answer",
"Very secure",
"Quite secure",
"Not very secure",
"Not at all secure"
)

values.170 = c(-2,1,2,3,4)

v142_respect_human_rights = c(
"No answer",
"A great deal of respect",
"Some respect",
"Not much respect",
"No respect at all"
)

values.142 = c(-2,1,2,3,4)


v190_gone_without_medicine = c(
"No answer",
"Often",
"Sometimes",
"Rarely",
"Never"
)

values.190 = c(-2,1,2,3,4)

v5_friends = c(
"No answer",
"Very important",
"Rather important",
"Not very important",
"Not at all important"
```

```
)

values.5 = c(-2,1,2,3,4)
```

```
categories <- c("Employment", "Education", "Security", "Human Rights", "Treatment Levels", "Friendship
questions <- c("Q279", "Q275", "Q131", "Q253", "Q53", "Q2")
key <- c("V249", "Q275", "V170", "V142", "V190", "V5")

# Define vectors for each category
key <- c("V249", "Q275", "V170", "V142", "V190", "V5")

vectors <- list(
  list(
    values = c(-2, 1, 2, 3, 4, 5, 6, 7, 8),
    chars = c(
      "No answer",
      "Full time employee (30 hours a week or more)",
      "Part time employee (less than 30 hours a week)",
      "Self-employed",
      "Retired / On a pension",
      "Home duties, not otherwise employed",
      "Student",
      "Unemployed",
      "Other (please specify)"
    )
  ),
  list(
    values = c(-2, 1, 2, 3, 4, 5, 7, 8, 9),
    chars = c(
      "No answer",
      "No formal education",
      "Primary education only",
      "Lower secondary education (i.e. Year 9 or less)",
      "Upper secondary education (i.e. between Year 10 and Year 12)",
      "Post-secondary non-tertiary education (e.g. apprenticeship or certificate)",
      "Bachelor or equivalent",
      "Master or equivalent",
      "Doctoral or equivalent"
    )
  ),
  list(
    values = c(-2, 1, 2, 3, 4),
    chars = c(
      "No answer",
      "Very secure",
      "Quite secure",
      "Not very secure",
      "Not at all secure"
    )
  ),
  list(
    values = c(-2, 1, 2, 3, 4),
    chars = c(
      "No answer",
```

```
      "A great deal of respect",
      "Some respect",
      "Not much respect",
      "No respect at all"
    )
  ),
  list(
    values = c(-2, 1, 2, 3, 4),
    chars = c(
      "No answer",
      "Often",
      "Sometimes",
      "Rarely",
      "Never"
    )
  ),
  list(
    values = c(-2, 1, 2, 3, 4),
    chars = c(
      "No answer",
      "Very important",
      "Rather important",
      "Not very important",
      "Not at all important"
    )
  )
)

# Combine data into a dataframe
Question.key <- bind_rows(lapply(1:length(categories), function(i) {
  data.frame(
    Categories = rep(categories[i], length(vectors[[i]]$values)),
    Question.Number = rep(questions[i], length(vectors[[i]]$values)),
    Codebook = rep(key[i], length(vectors[[i]]$values)),
    Question.values = vectors[[i]]$values,
    Question.chars = vectors[[i]]$chars
  )
}))
```

```
survey.predictors <- data.frame(
  education = survey.data$Q275,
  employment = survey.data$V249,
  security = survey.data$V170,
  rights = survey.data$V142,
  health = survey.data$V190,
  social = survey.data$V5
)
```

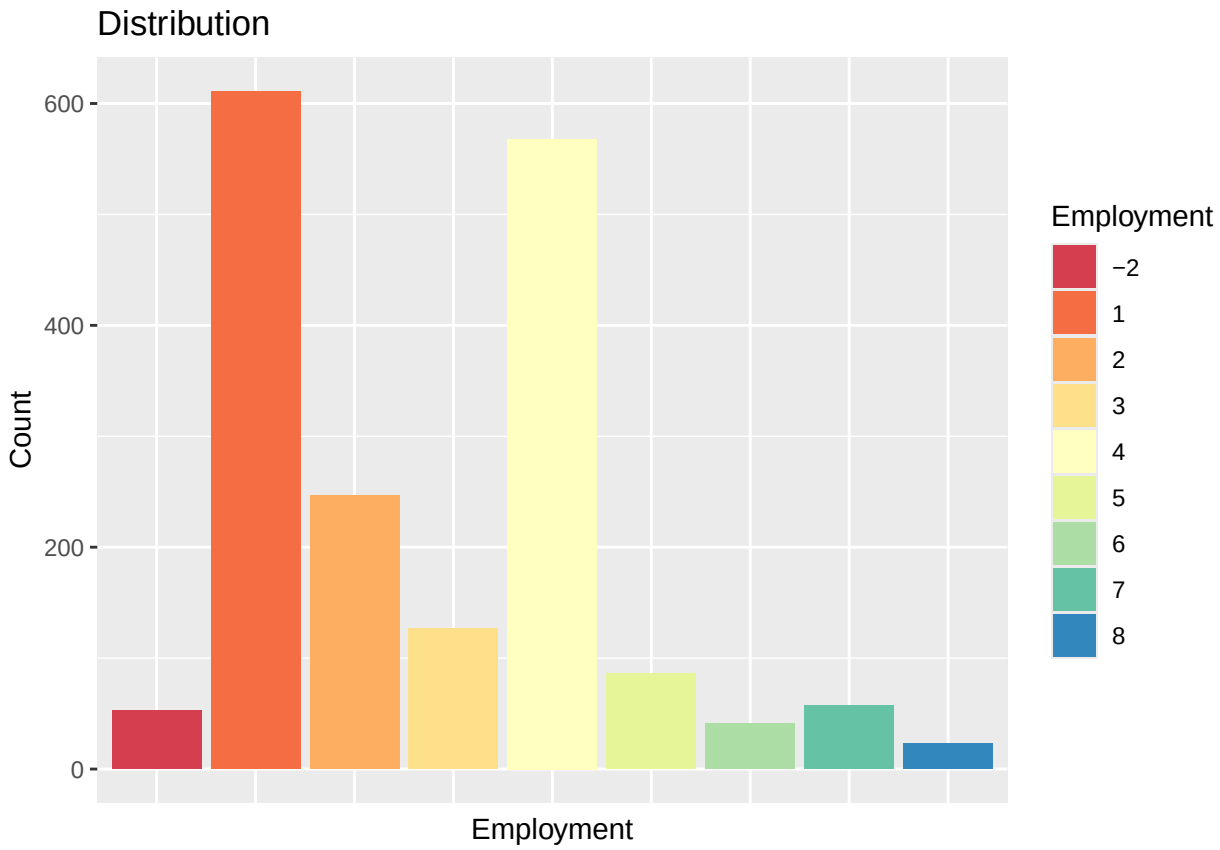
```
summary = describe(survey.predictors)
print(summary)
```

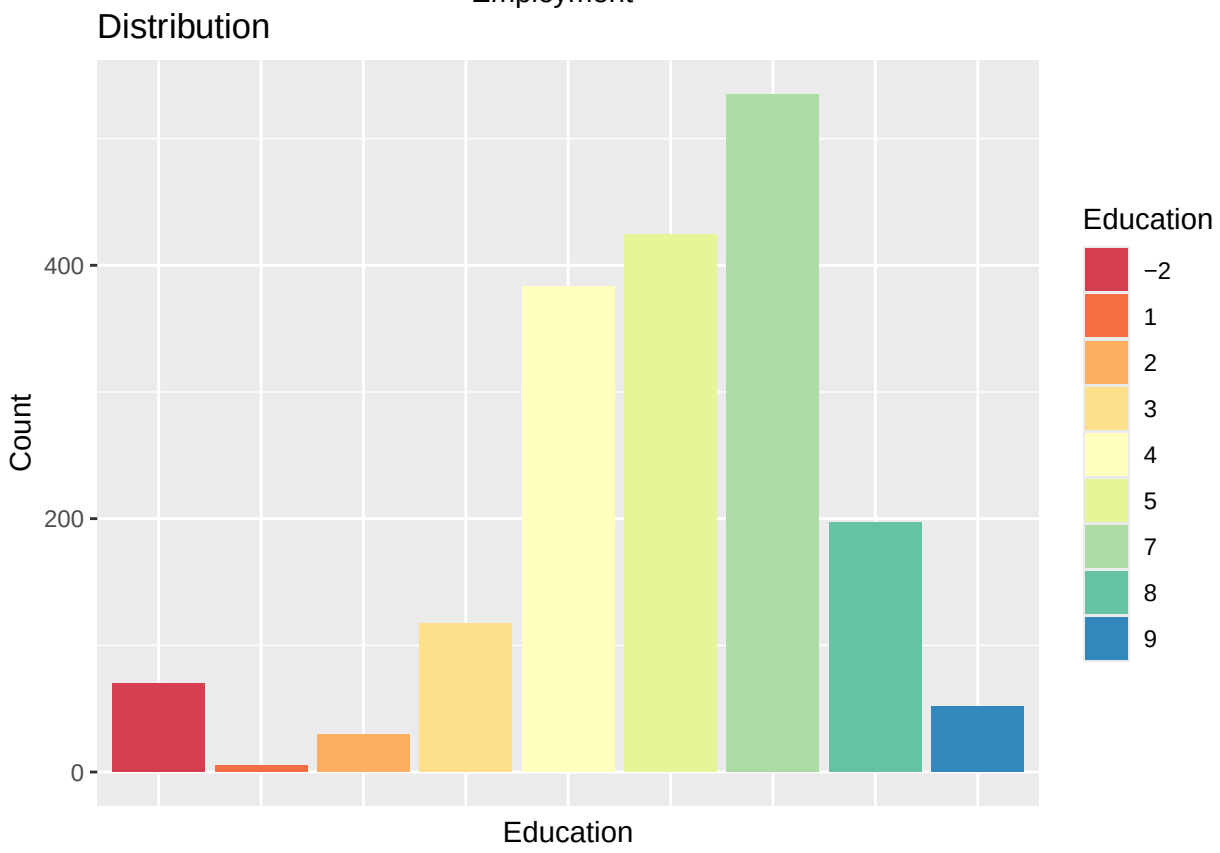
```
##            vars    n mean   sd median trimmed  mad min max range  skew kurtosis
## education     1 1813 5.36 2.25      5    5.56 2.97  -2   9    11 -1.14     2.17
## employment    2 1813 2.71 1.91      2    2.59 1.48  -2   8    10  0.23     0.19
```

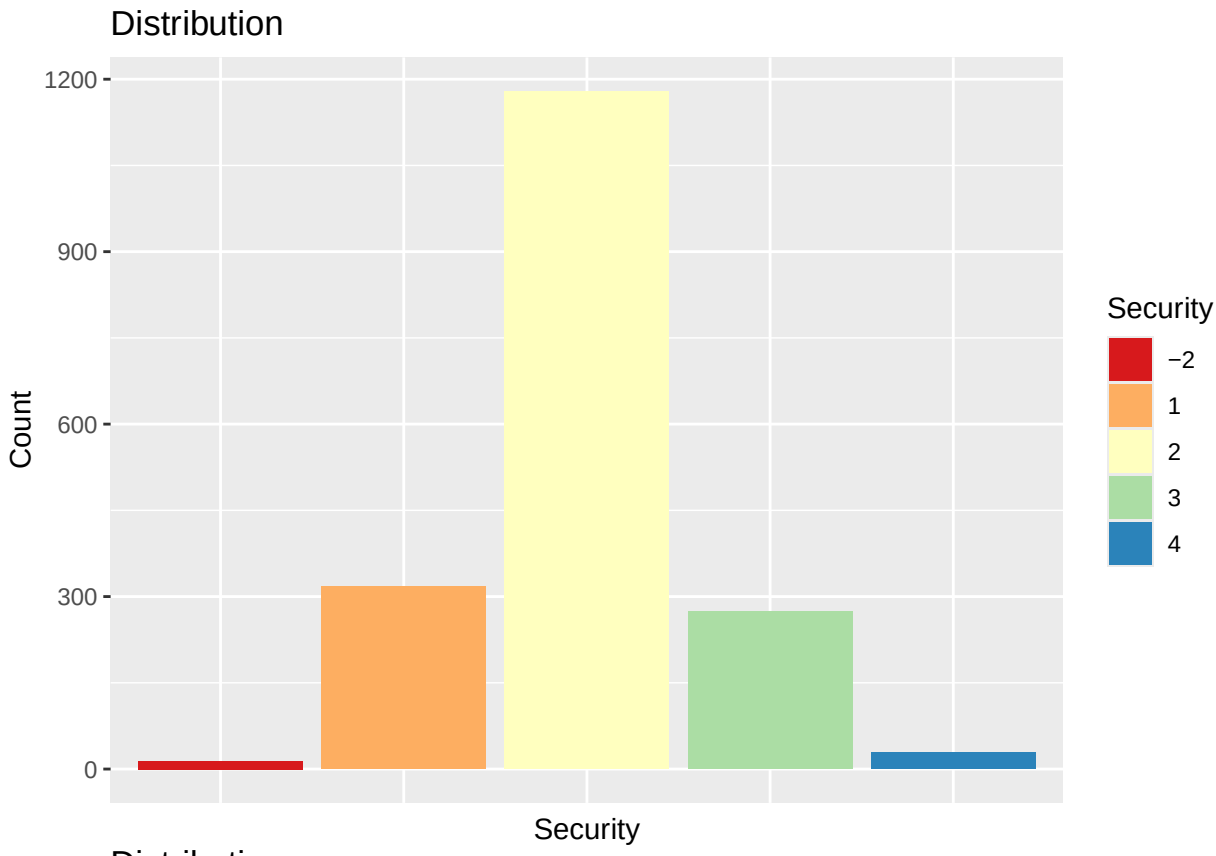
```
## security      3 1813 1.98 0.72      2    1.98 0.00  -2   4     6 -0.97     6.58
## rights        4 1813 1.88 0.80      2    1.85 0.00  -2   4     6 -0.35     3.51
## health        5 1813 3.64 0.88      4    3.87 0.00  -2   4     6 -3.50    15.93
## social        6 1813 1.39 0.80      1    1.40 0.00  -2   4     6 -1.44     6.31
##                se
## education  0.05
## employment 0.04
## security   0.02
## rights     0.02
## health     0.02
## social     0.02
```

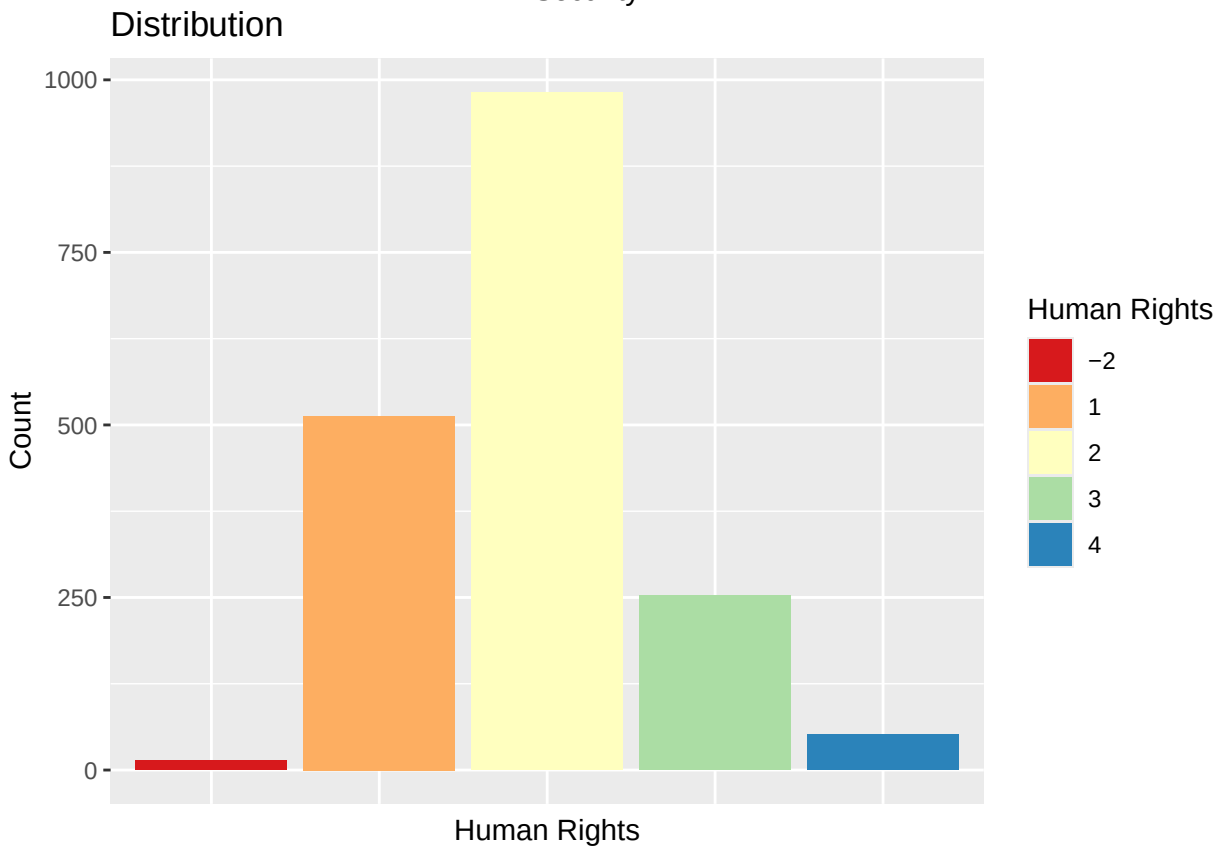
Distribution of predictors

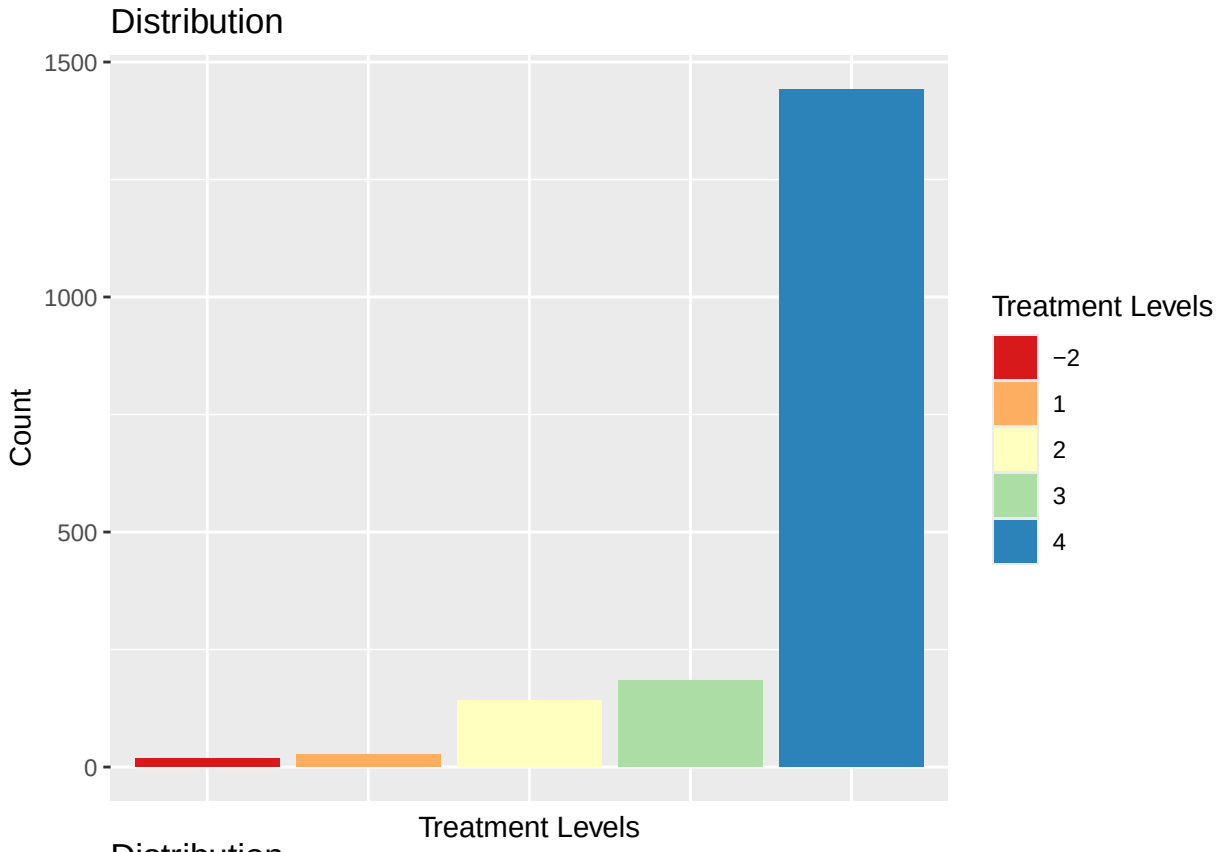
```
plot_barplots <- function(column, name, values_fill) {
  ggplot(survey.data, aes(x = factor(!!column), fill = factor(!!column))) +
    geom_bar() +
    labs(title = "Distribution", x = name, fill = name, y = "Count") +
    scale_fill_brewer(palette = "Spectral") +
    theme(axis.text.x = element_blank(), axis.ticks.x = element_blank())
}

# Get unique codebooks
unique_codebooks <- unique(Question.key$Codebook)
# Loop through each unique codebook and plot bar plot
for (codebook in unique_codebooks) {
  subset_data <- filter(Question.key, Codebook == codebook)
  print(plot_barplots(column = sym(codebook), name = unique(subset_data$Categories), values_fill = uniq
}
```

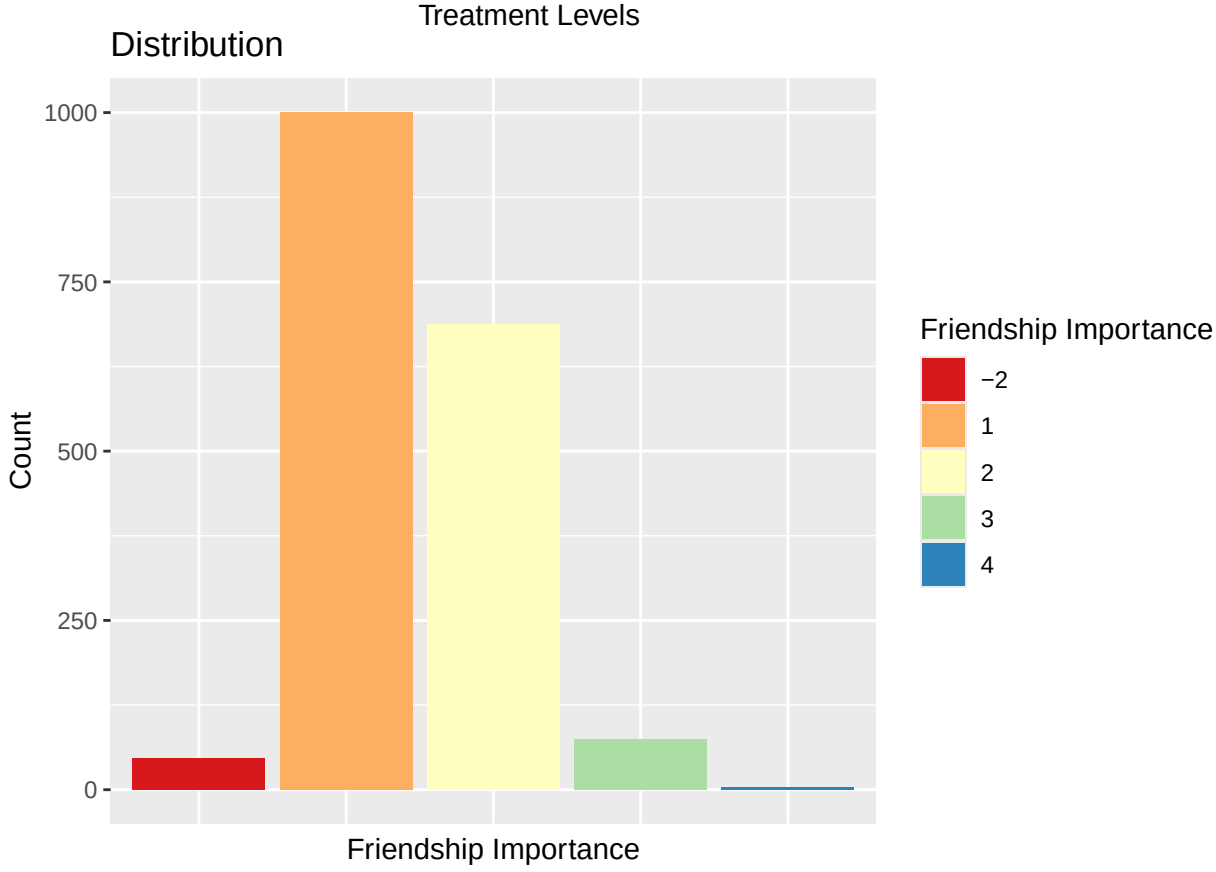

Distribution
600
400
200
0
Count
Employment
Employment
−2
1
2
3
4
5
6
7
8


Distribution
400
200
0
Count
Education
Education
−2
1
2
3
4
5
7
8
9


Distribution
1200
900
600
300
0
Count
Security
Security
−2
1
2
3
4


Distribution
1000
750
500
250
0
Count
Human Rights
Human Rights
−2
1
2
3
4





!!TODO PLEASE ADD DESCRIPTIONS FOR ABOVE GRAPHS

Employment

Descriptive Analysis:

- Full-time employment is most common, suggesting stable work schedules for many.
- Significant numbers of students and part-time employees, indicating a mix of work and study.
- Fewer respondents in self-employed, retired, and home duties categories, showing less representation of these demographics.
- Positively skewed distribution with a majority as full-time employees and diminishing counts towards 'Unemployed' and 'Other'.

Statistical Analysis:

- Mean employment score around 2.709, indicating a skew towards full-time employment.
- Median of 2, reinforcing the prevalence of full-time employment.

Education

Descriptive Analysis:

- Upper secondary education is most prevalent, indicating a common level of educational attainment.
- A considerable proportion of respondents with a bachelor's degree, possibly reflecting the target demographic or societal education trends.
- Lesser counts of post-secondary non-tertiary education, master's, or doctoral degrees.
- A distribution with a primary mode at upper secondary education and a secondary mode at the bachelor level, with tapering counts at the lowest and highest education levels.

Statistical Analysis:

- Mean education level approximately 5.36, showing a skew towards upper secondary education.
- Median value of 5, indicating over half of the respondents completed at least upper secondary education.

Security Perception

Descriptive Analysis:

- Majority of respondents feel quite secure, which might reflect societal stability or personal circumstances.
- Smaller proportions feel very secure or not secure, suggesting fewer extremes in security perception.
- Negatively skewed distribution where a large majority feels 'Quite secure', and fewer responses are on the 'Not very secure' or 'Not at all secure' end.

Statistical Analysis:

- Mean close to 2, leaning towards 'Quite secure'.
- Median of 2, confirming 'Quite secure' as a common sentiment.

Human Rights Perception

Descriptive Analysis:

- Most believe there is 'some respect' for human rights, indicating moderate views.
- Significant perception of 'a great deal of respect', suggesting a positive outlook among many.
- A distribution with a slight negative skew, indicating that most respondents feel there is 'Some respect' for human rights, with a substantial number also feeling there is 'A great deal of respect'.

Statistical Analysis:

- Mean of approximately 1.882, hinting the average perception is close to 'some respect'.
- Median of 2, aligning with the average perception towards human rights.

Health Treatment Levels

Descriptive Analysis:

- Predominant 'never' category might suggest good health or barriers to healthcare.
- 'Sometimes' as the next most common response, indicating occasional health concerns.
- A heavily positively skewed distribution, where most respondents 'Never' seek treatment, with progressively fewer responses for more frequent healthcare utilisation.

Statistical Analysis:

- Mean around 3.638, trending towards infrequently seeking treatment.
- Median of 4, suggesting the middle ground of responses leans towards 'rarely'.

Friendship Importance

Descriptive Analysis:

- Friendship considered 'very important' by many, emphasizing the high value on social relationships.
- 'A strongly negatively skewed distribution, showing that 'Very important' is the predominant response, with 'Not at all important' being the least common.

Statistical Analysis:

- Mean skewed towards 'very important', with a mean value of around 1.839.
- Median value of 1, indicating a majority view friendship as 'very important'. »»»> sarah

Lab 2: Relationship of independent and dependent variables

Recode our variables to provide the variables with more intuitive names, to make our work easier and also recode our predictors to character variables to do descriptive statistics.

```
survey.data <- survey.data %>%
  mutate(happiness = dplyr::recode(V10,
                                   '1' = 4,
                                   '2' = 3,
                                   '3' = 2,
                                   '4' = 1,
                                   '-2' = NULL),

         health = dplyr::recode(V11,
                                '1' = 5,
                                '2' = 4,
                                '3' = 3,
                                '4' = 2,
                                '5' = 1,
                                '-2' = NULL),

         finances = dplyr::recode(V59,
                                  '-2' = NULL,
                                  .default = V59),
```

```
        satisfaction = dplyr::recode(V23,
                                     '-2' = NULL,
                                     .default = V23),
        freedom = dplyr::recode(V55,
                                     '-2' = NULL,
                                     .default = V55))
```

Factor Analysis

Factor Analysis is a measurement model of a latent variable. Latent variable cannot be directly measured. Instead, it is seen through relationships between variables. We assume latent factor drives responses to variables .

```
fa.fit <- fa(survey.data[,c("happiness",
                            "health",
                            "finances",
                            "satisfaction",
                            "freedom")],
             nfactors=1)

survey.data$life.quality <- as.numeric(fa.fit$scores)
```

Factor analysis using fa will calculate the optimal weights as seen below.

```
## Factor Analysis using method =  minres
## Call: fa(r = survey.data[, c("happiness", "health", "finances", "satisfaction",
##     "freedom")], nfactors = 1)
## Standardized loadings (pattern matrix) based upon correlation matrix
##                MR1   h2   u2 com
## happiness    0.64 0.41 0.59   1
## health       0.52 0.28 0.72   1
## finances     0.63 0.39 0.61   1
## satisfaction 0.93 0.86 0.14   1
## freedom      0.71 0.50 0.50   1
##
##                  MR1
## SS loadings     2.43
## Proportion Var 0.49
##
## Mean item complexity =  1
## Test of the hypothesis that 1 factor is sufficient.
##
## df null model =  10  with the objective function =  1.73 with Chi Square =  3136.16
## df of  the model are 5  and the objective function was  0.02
##
## The root mean square of the residuals (RMSR) is  0.02
## The df corrected root mean square of the residuals is  0.04
##
## The harmonic n.obs is  1788 with the empirical chi square  22.35  with prob <  0.00045
## The total n.obs was  1813  with Likelihood Chi Square =  33.28  with prob <  3.3e-06
##
## Tucker Lewis Index of factoring reliability =  0.982
## RMSEA index =  0.056  and the 90 % confidence intervals are  0.039 0.075
```

```
## BIC =  -4.23
## Fit based upon off diagonal values = 1
## Measures of factor score adequacy
##                                                  MR1
## Correlation of (regression) scores with factors   0.95
## Multiple R square of scores with factors          0.90
## Minimum correlation of possible factor scores     0.79
```

```
summary(survey.data$life.quality)
```

```
##     Min.  1st Qu.   Median     Mean  3rd Qu.     Max.     NA's
## -3.92679 -0.43932  0.17440 -0.00189  0.65102  1.50623       55
```

As you can see, these are approximately standardised, with a mean of zero and standard deviation of (almost) one. We can then use this to analyse the association between quality of life and different individual characteristics that are also available in this dataset.

```
ggplot(survey.data, aes(life.quality)) +
  geom_histogram(fill = 'black') +
  theme_minimal()
```

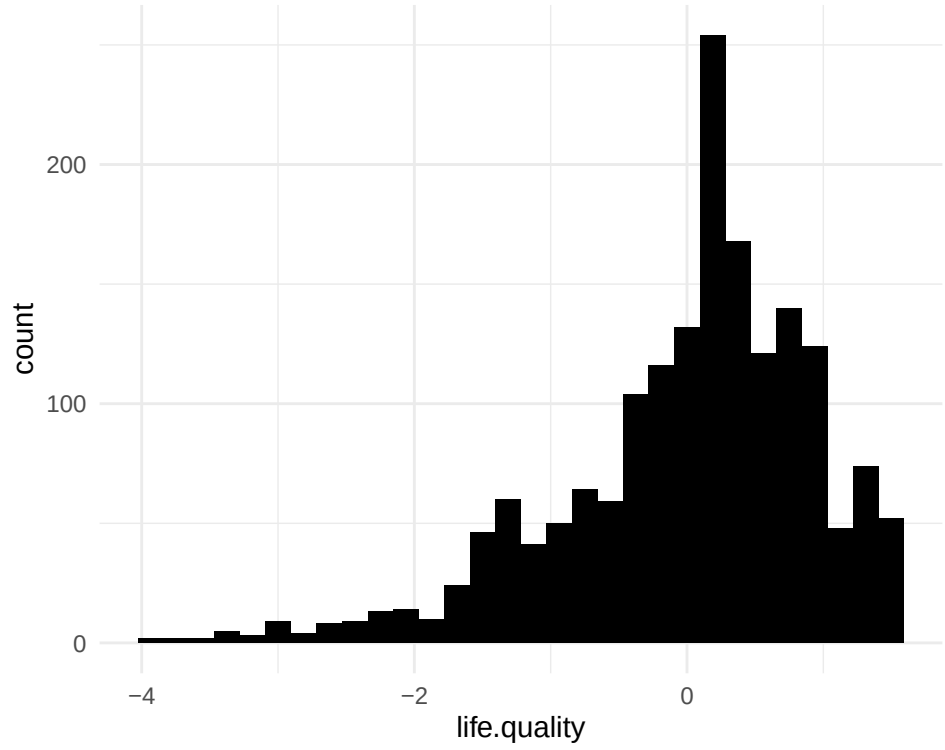


Figure 1: Distribution of quality of life measure produced by factor analysis.

Descriptive Statistics

As seen above, there are 55 NA values which will be difficult to plot. We will remove these.

```
survey.data = drop_na(survey.data, life.quality)
```

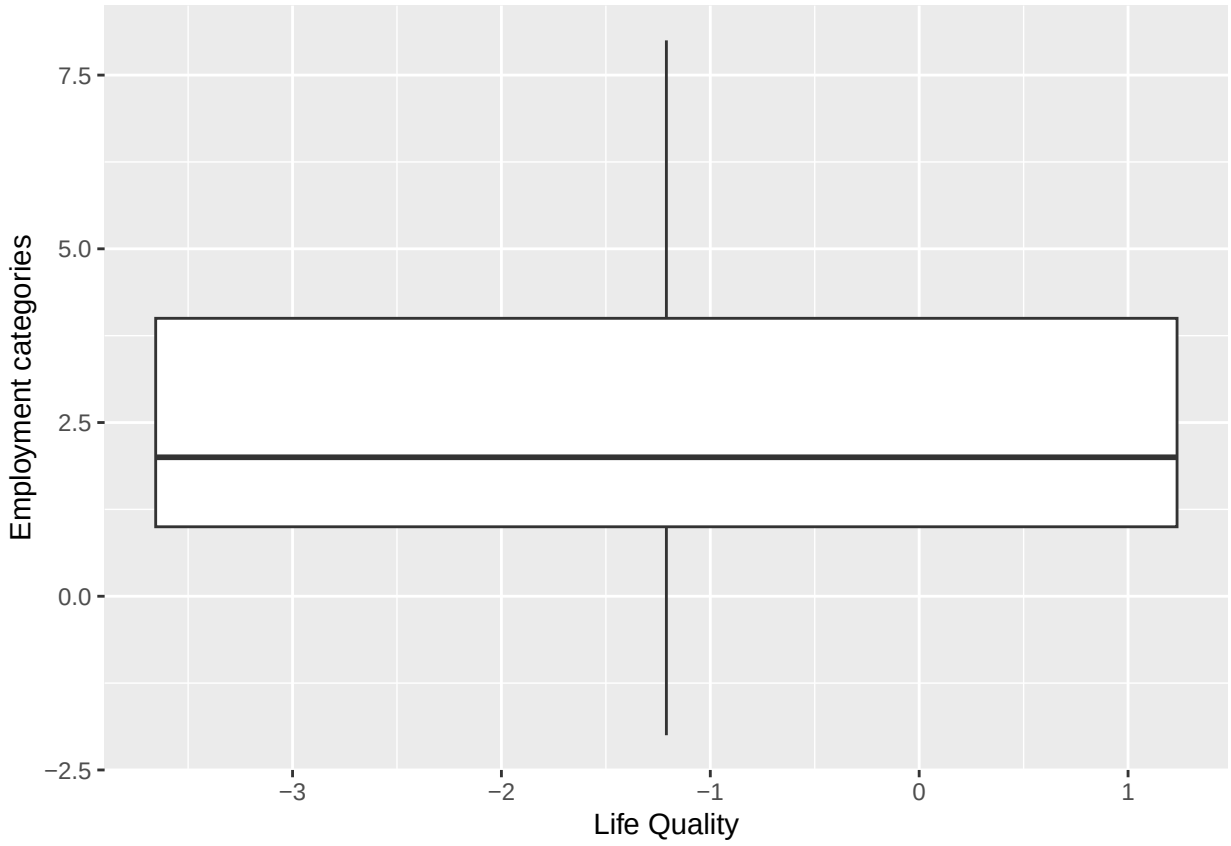
```
ggplot(survey.data, aes(x=life.quality, y=V249, fill = V249)) +
  geom_boxplot() +
```

```
  xlab("Life Quality") +
  ylab("Employment categories") +
  scale_fill_brewer(palette = "Spectral") +
  theme(legend.position = "None")
```

Relationship of dependent variable (quality of life) and the chosen predictors

```
## Warning: Continuous x aesthetic
## i did you forget `aes(group = ...)`?
```

```
## Warning: The following aesthetics were dropped during statistical transformation: fill.
## i This can happen when ggplot fails to infer the correct grouping structure in
##   the data.
## i Did you forget to specify a `group` aesthetic or to convert a numerical
##   variable into a factor?
```

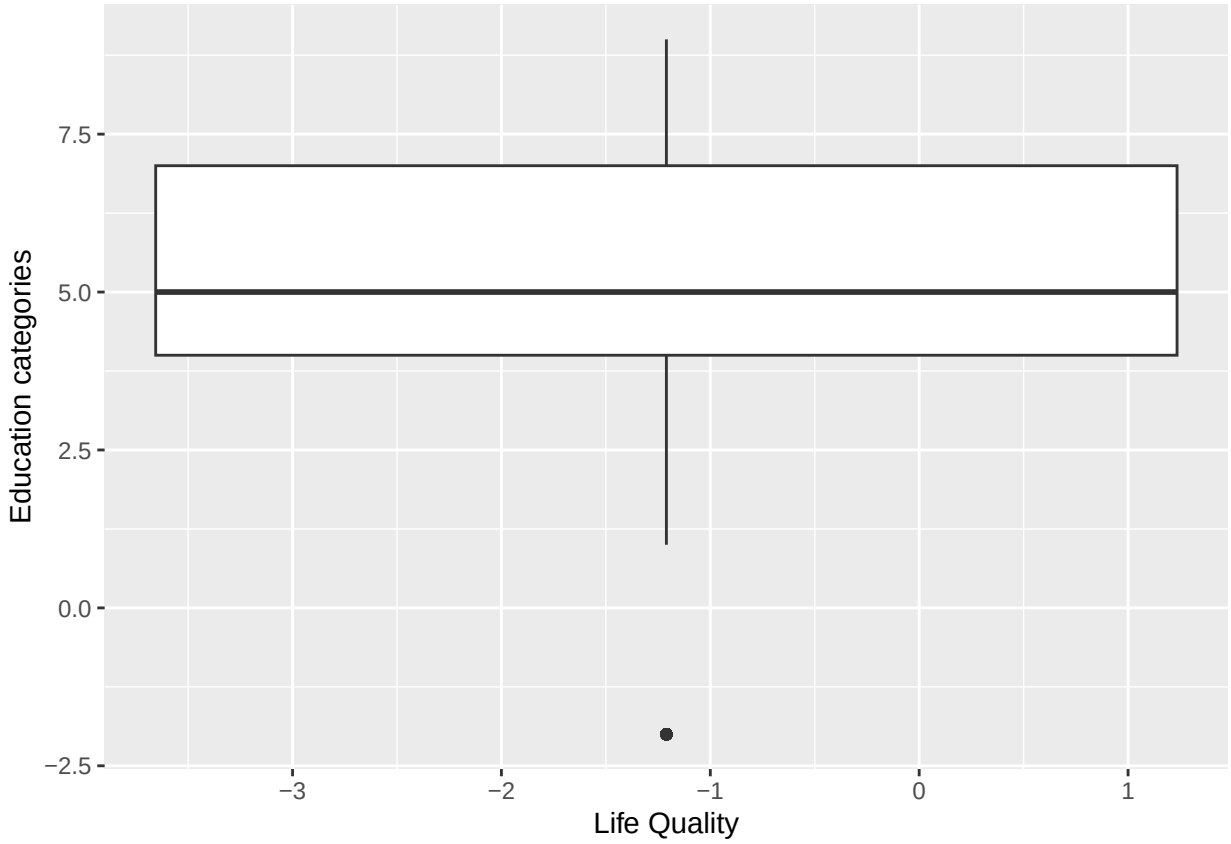


The relationship plotted in this bar plot demonstrates that those who are employed tend to have a higher life quality than those who are not (besides those who are retired). Interestingly, those who are full time employed and retried show both ends quality of life with outliers towards the negative life quality (suggesting people who may struggle to increase life quality even though they have fulltime income or pension). Unemployment shows the largest range of life quality while as self-employed is mainly skewed towards higher values of life quality.

```
ggplot(survey.data, aes(x=life.quality, y=Q275, fill = Q275)) +
  geom_boxplot() +
  xlab("Life Quality") +
  ylab("Education categories") +
  scale_fill_brewer(palette = "Spectral") +
  theme(legend.position = "None")
```

```
## Warning: Continuous x aesthetic
## i did you forget `aes(group = ...)`?
```

```
## Warning: The following aesthetics were dropped during statistical transformation: fill.
## i This can happen when ggplot fails to infer the correct grouping structure in
##   the data.
## i Did you forget to specify a `group` aesthetic or to convert a numerical
##   variable into a factor?
```

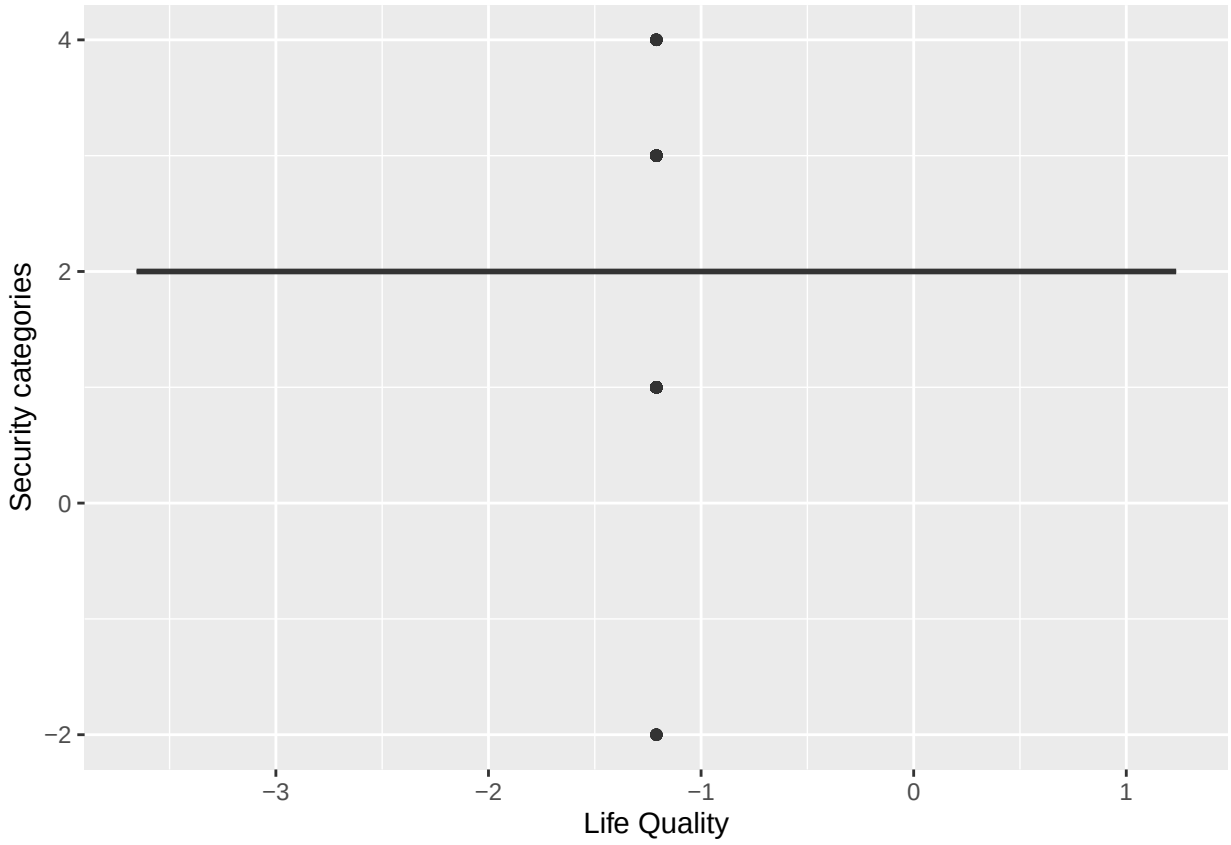


Life quality in relation to education interestingly is always has a median above 0, showing positive median life qualities for all categories. However, the spread of life quality is diverse with those having a doctoral or masters tending to have a smaller IQR and positioned to have a higher life quality while as those with primary education only or no formal education, more prone to a larger IQR spread suggesting more people experiencing lower life qualities in those categories as well as high. Interestingly, there are outliers in individuals with bachelors or post secondary non-tertiary education suggesting that there could be people with degrees however unable to achieve higher life quality maybe due to of lack of access to jobs, not enough specialisation in their degrees.

```
ggplot(survey.data, aes(x=life.quality, y=V170, fill = V170)) +
  geom_boxplot() +
  xlab("Life Quality") +
  ylab("Security categories") +
  scale_fill_brewer(palette = "Spectral") +
  theme(legend.position = "None")
```

```
## Warning: Continuous x aesthetic
## i did you forget `aes(group = ...)`?
```

```
## Warning: The following aesthetics were dropped during statistical transformation: fill.
## i This can happen when ggplot fails to infer the correct grouping structure in
##   the data.
## i Did you forget to specify a `group` aesthetic or to convert a numerical
##   variable into a factor?
```

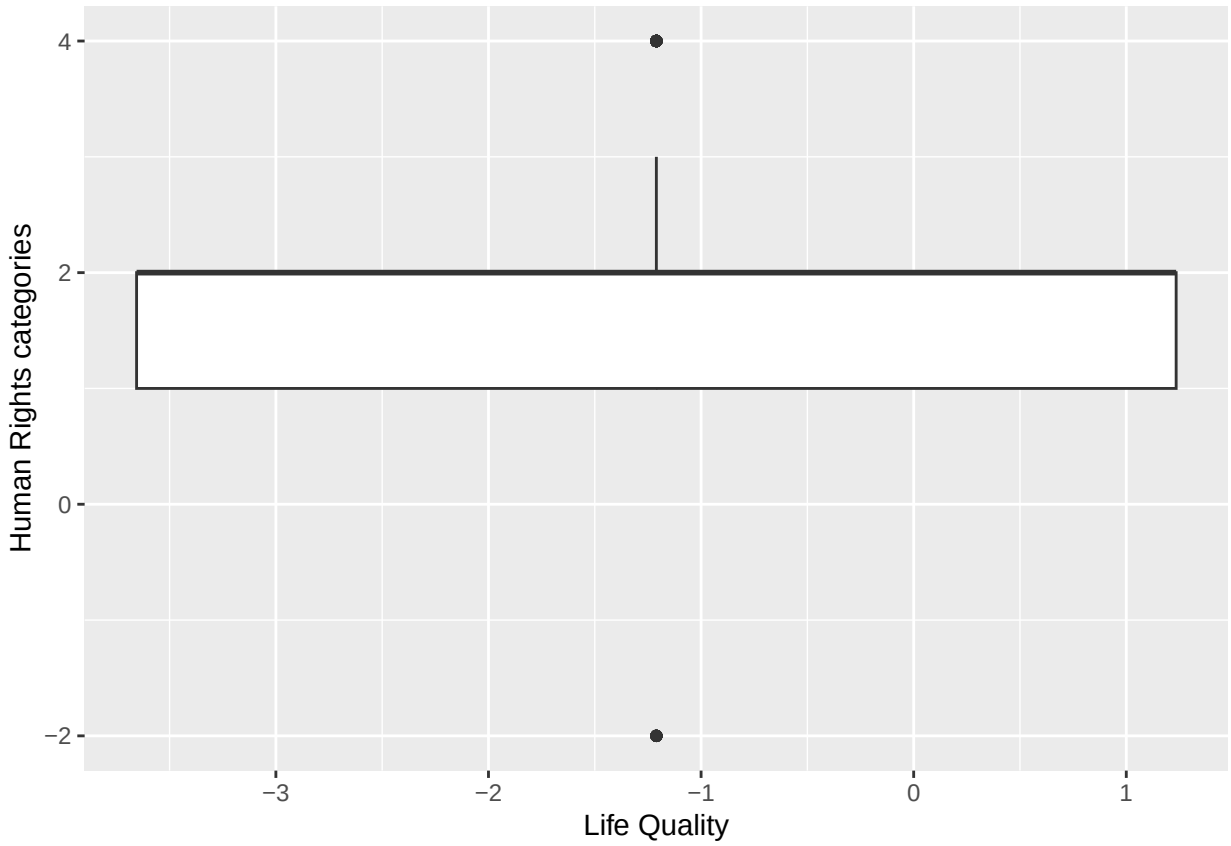


Security demonstrates a strong positive relationship with life quality, those who are not feeling secure tend to have lower life quality while as those who are very secure tend to have higher life quality, aligning with our theory described in lab 1. Interestingly, those who are very secure, have a positive IQR, demonstrating a high proportion with positive life qualities while as those who are not at all secure have a large IQR below 0.

```
ggplot(survey.data, aes(x=life.quality, y=V142, fill = V142)) +
  geom_boxplot() +
  xlab("Life Quality") +
  ylab("Human Rights categories") +
  scale_fill_brewer(palette = "Spectral") +
  theme(legend.position = "None")
```

```
## Warning: Continuous x aesthetic
## i did you forget `aes(group = ...)`?
```

```
## Warning: The following aesthetics were dropped during statistical transformation: fill.
## i This can happen when ggplot fails to infer the correct grouping structure in
##   the data.
## i Did you forget to specify a `group` aesthetic or to convert a numerical
##   variable into a factor?
```

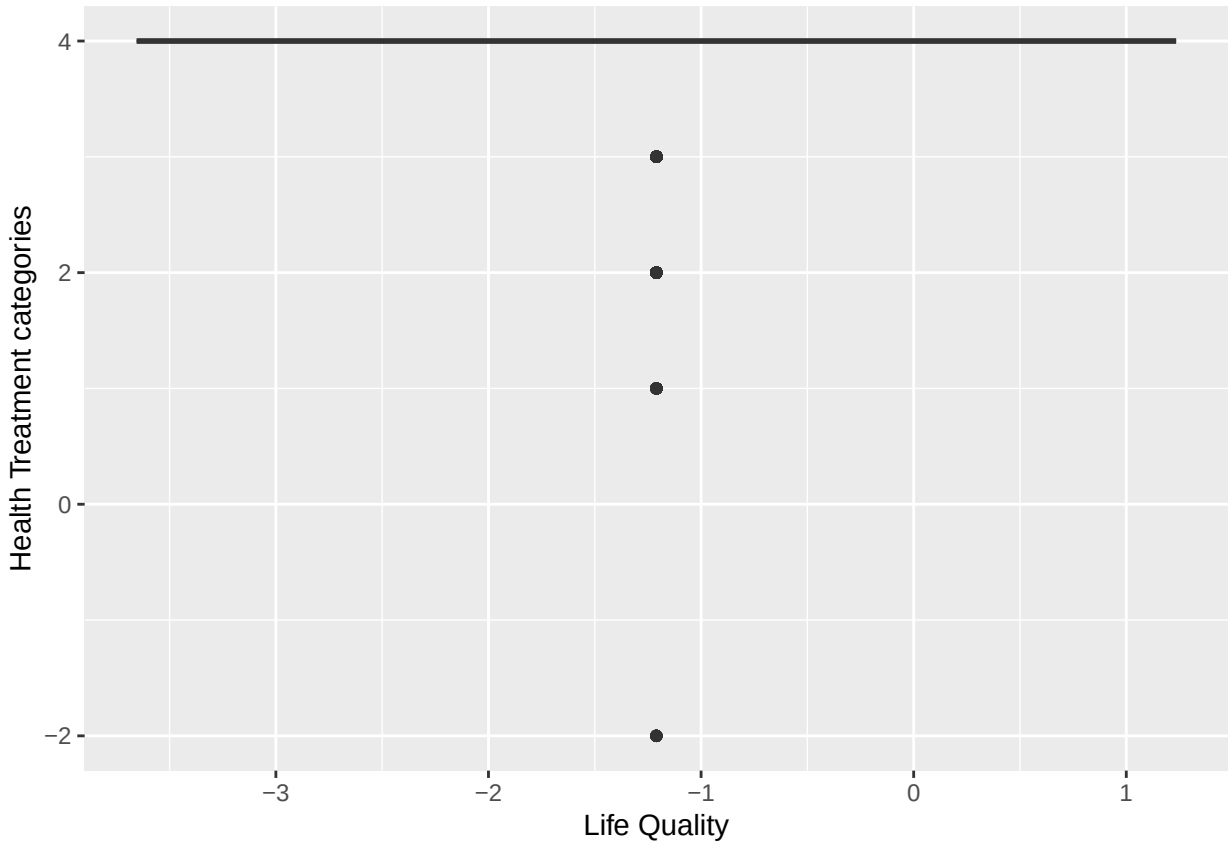


Human rights shows an interesting relationship to life quality. Those with a great deal of respect tend to have higher life quality in comparison to no respect at all, aligning with our theory. It is interesting that with no human respect at all, there can still be values in the positive life quality with Q3 reaching positive life quality values and the whisker on the right still reaching high life quality values.

```
ggplot(survey.data, aes(x=life.quality, y=V190, fill = V190)) +
  geom_boxplot() +
  xlab("Life Quality") +
  ylab("Health Treatment categories") +
  scale_fill_brewer(palette = "Spectral") +
  theme(legend.position = "None")
```

```
## Warning: Continuous x aesthetic
## i did you forget `aes(group = ...)`?
```

```
## Warning: The following aesthetics were dropped during statistical transformation: fill.
## i This can happen when ggplot fails to infer the correct grouping structure in
##   the data.
## i Did you forget to specify a `group` aesthetic or to convert a numerical
##   variable into a factor?
```

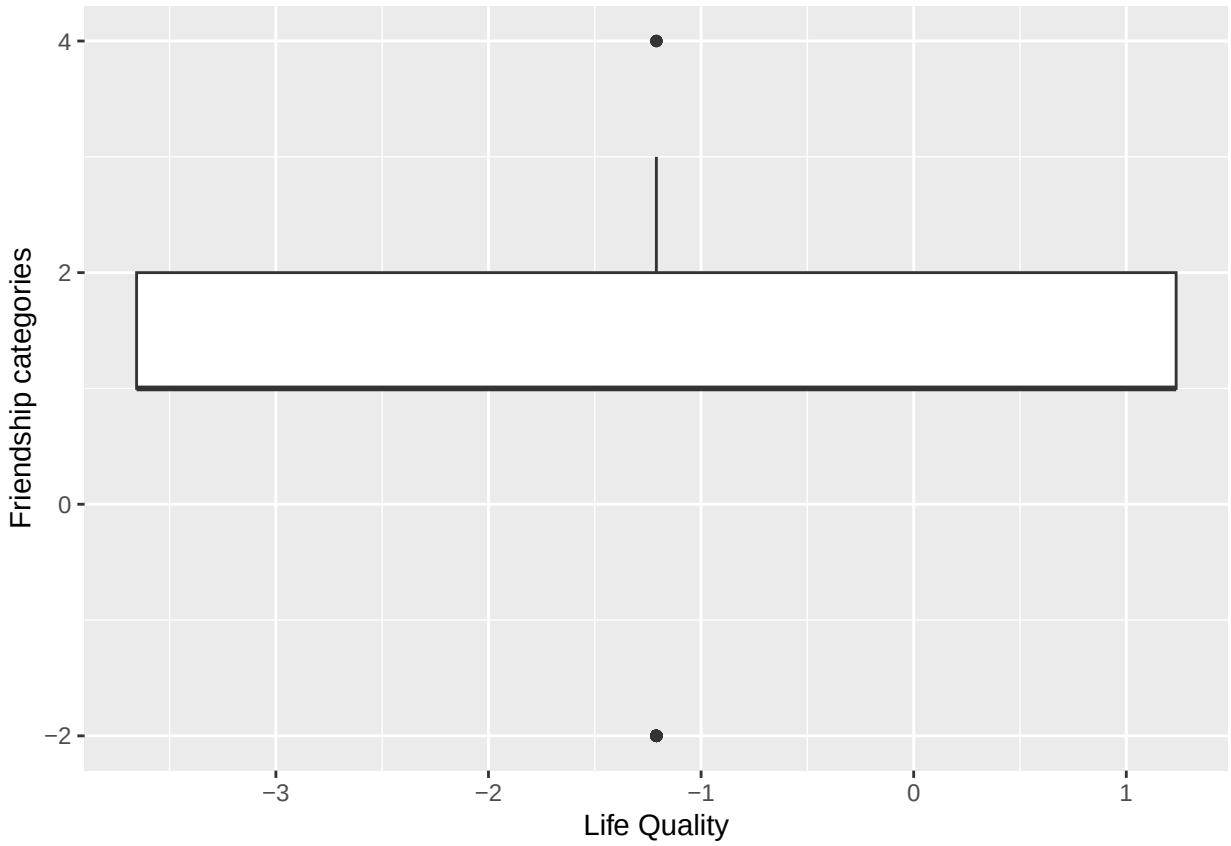


Those who never get health treatment show two ends of the spectrum of life quality, those who never get health treatment due to never being ill and those who never get health treatment due to lack of access. If we go with the first reasoning, the positive skew of the Never category makes sense as those with higher life quality will tend to not be ill. This is further represented in the lowest box plot category of Often, suggesting that those who require regular health treatment and are often ill, have lower life qualities. Similarly, the category of Sometimes has a slightly higher IQR range and then Rarely has an even higher IQR range. This relationship represent that those with better health tend to have a higher life quality.

```
ggplot(survey.data, aes(x=life.quality, y=V5, fill = V5)) +
  geom_boxplot() +
  xlab("Life Quality") +
  ylab("Friendship categories") +
  scale_fill_brewer(palette = "Spectral") +
  theme(legend.position = "None")
```

```
## Warning: Continuous x aesthetic
## i did you forget `aes(group = ...)`?
```

```
## Warning: The following aesthetics were dropped during statistical transformation: fill.
## i This can happen when ggplot fails to infer the correct grouping structure in
##   the data.
## i Did you forget to specify a `group` aesthetic or to convert a numerical
##   variable into a factor?
```



Friendship is obviously an important factor to life quality with those who deem friendship as Very Important having the greatest positive skew in the boxplot. Rarely Important has not much of a lower IQR but Not very important and Not at all important highlight the decrease on life quality and the significance of this social factor on an individuals life quality.

Regression Model

In our dataset, certain variables fall into an ordinal category, which means they are ranked on a scale that assesses concepts, such as "perceived security." These ordinal variables are coded numerically to reflect a spectrum where lower numbers denote a higher sense of security, and higher numbers correspond to a lower sense of security. We can standardise these variables due to their sequential nature, allowing us to treat them as continuous predictors in our regression analysis.

In contrast, variables that capture education and employment status lack a natural, hierarchical structure; for instance, being self-employed isn't qualitatively superior to being employed full-time. Given their nominal characteristics, these variables will be incorporated into our regression model as categorical factors, acknowledging the absence of a rank order among the categories.

```
## creating a new data frame that will store the independant variables we are testing.
survey.predictors <- data.frame(
  education = survey.data$Q275,
  employment = survey.data$V249,
  security = survey.data$V170,
  rights = survey.data$V142,
  health = survey.data$V190,
  social = survey.data$V5,
  life.qual = survey.data$life.qual
)
```

```r
## including the categorical answers

#### Employment Q279: Are you employed now or not? If yes, about how many hours a week do you work? If
survey.predictors$emp_cat <- recode(survey.data$V249,
                            `-2` = "No answer",
                            `1` = "Full time employee (30 hours a week or more)",
                            `2` = "Part time employee (less than 30 hours a week)",
                            `3` = "Self-employed",
                            `4` = "Retired / On a pension",
                            `5` = "Home duties, not otherwise employed",
                            `6` = "Student",
                            `7` = "Unemployed",
                            `8` = "Other (please specify)")

#### Education - Q275: What is your highest educational level that you have attained?
survey.predictors$edu_cat <- recode(survey.data$Q275,
                            `-2` = "No answer",
                            `1` = "No formal education",
                            `2` = "Primary education only",
                            `3` = "Lower secondary education (i.e. Year 9 or less)",
                            `4` = "Upper secondary education (i.e. between Year 10 and Year 12)",
                            `5` = "Post-secondary non-tertiary education (e.g. apprenticeship or certifi
                            `7` = "Bachelor or equivalent",
                            `8` = "Master or equivalent",
                            `9` = "Doctoral or equivalent")


#### Security - Q131: how secure do you feel these days?
survey.predictors$secure_cat <- recode(survey.data$V170,
                            `-2` = "No answer",
                            `1` = "Very secure",
                            `2` = "Quite secure",
                            `3` = "Not very secure",
                            `4` = "Not at all secure")

#### Human Rights - Q253: How much respect is there for individual human rights nowadays in this countr
survey.predictors$rights_cat <- recode(survey.data$V142,
                            `-2` = "No answer",
                            `1` = "A great deal of respect",
                            `2` = "Some respect",
                            `3` = "Not much respect",
                            `4` = "No respect at all")

#### Health Levels - Q53: "In the last 12 months, how often have you or your family gone without medici
survey.predictors$health_cat <- recode(survey.data$V190,
                            `-2` = "No answer",
                            `1` = "Often",
                            `2` = "Sometimes",
                            `3` = "Rarely",
                            `4` = "Never")

#### Social & Personal Connectivity - Q2. For each of the following, indicate how important it is in yo
survey.predictors$social_cat <- recode(survey.data$V5,
```

```
                          `-2` = "No answer",
                          `1` = "Very important",
                          `2` = "Rather important",
                          `3` = "Not very important",
                          `4` = "Not at all important")
```

```
##Dropping the non answers as this will no help our regression model as it provides no information.
survey.predictors2 = drop_na(survey.predictors, life.qual)
survey.predictors2 <- survey.predictors2[!(survey.predictors2$education == -2 |
                           survey.predictors2$employment == -2 |
                           survey.predictors2$security == -2 |
                           survey.predictors2$rights == -2 |
                           survey.predictors2$health == -2 |
                            survey.predictors2$social == -2 )  ,]


scaled_df <- survey.predictors2 %>%
  mutate(
    scaled_education = scale(education),
    scaled_employment = scale(employment),
    scaled_security = scale(security),
    scaled_rights = scale(rights),
    scaled_health = scale(health) ,
    scaled_social = scale(social) ,
    scaled_life = scale(life.qual)
  )
# Then run the regression model on the new dataframe:
regmodel <- lm(life.qual ~ emp_cat + edu_cat + scaled_security + scaled_rights + scaled_health + scaled

# Summarise the regression model
summary(regmodel)
```

```
##
## Call:
## lm(formula = life.qual ~ emp_cat + edu_cat + scaled_security +
##     scaled_rights + scaled_health + scaled_social, data = scaled_df)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -3.4911 -0.3882  0.0831  0.5410  2.4398
##
## Coefficients:
##                                                                    Estimate
## (Intercept)                                                       -0.055001
## emp_catHome duties, not otherwise employed                         0.058519
## emp_catOther (please specify)                                     -0.397207
## emp_catPart time employee (less than 30 hours a week)              0.076899
## emp_catRetired / On a pension                                      0.199020
## emp_catSelf-employed                                               0.184175
## emp_catStudent                                                    -0.300322
## emp_catUnemployed                                                 -0.535204
## edu_catDoctoral or equivalent                                      0.051841
## edu_catLower secondary education (i.e. Year 9 or less)             0.077258
## edu_catMaster or equivalent                                        0.050261
```

```
## edu_catNo formal education                                                    0.168186
## edu_catPost-secondary non-tertiary education (e.g. apprenticeship or certificate) -0.002792
## edu_catPrimary education only                                                -0.160930
## edu_catUpper secondary education (i.e. between Year 10 and Year 12)          -0.056069
## scaled_security                                                              -0.175845
## scaled_rights                                                                -0.118356
## scaled_health                                                                 0.236538
## scaled_social                                                                -0.080459
##                                                                             Std. Error
## (Intercept)                                                                   0.044376
## emp_catHome duties, not otherwise employed                                    0.098363
## emp_catOther (please specify)                                                 0.181176
## emp_catPart time employee (less than 30 hours a week)                         0.062766
## emp_catRetired / On a pension                                                 0.052391
## emp_catSelf-employed                                                          0.082495
## emp_catStudent                                                                0.132031
## emp_catUnemployed                                                             0.121466
## edu_catDoctoral or equivalent                                                 0.120766
## edu_catLower secondary education (i.e. Year 9 or less)                        0.096018
## edu_catMaster or equivalent                                                   0.069853
## edu_catNo formal education                                                    0.409225
## edu_catPost-secondary non-tertiary education (e.g. apprenticeship or certificate)   0.054922
## edu_catPrimary education only                                                 0.180245
## edu_catUpper secondary education (i.e. between Year 10 and Year 12)           0.057674
## scaled_security                                                               0.022054
## scaled_rights                                                                 0.021113
## scaled_health                                                                 0.021507
## scaled_social                                                                 0.020465
##                                                                             t value
## (Intercept)                                                                  -1.239
## emp_catHome duties, not otherwise employed                                    0.595
## emp_catOther (please specify)                                                -2.192
## emp_catPart time employee (less than 30 hours a week)                         1.225
## emp_catRetired / On a pension                                                 3.799
## emp_catSelf-employed                                                          2.233
## emp_catStudent                                                               -2.275
## emp_catUnemployed                                                            -4.406
## edu_catDoctoral or equivalent                                                 0.429
## edu_catLower secondary education (i.e. Year 9 or less)                        0.805
## edu_catMaster or equivalent                                                   0.720
## edu_catNo formal education                                                    0.411
## edu_catPost-secondary non-tertiary education (e.g. apprenticeship or certificate)  -0.051
## edu_catPrimary education only                                                -0.893
## edu_catUpper secondary education (i.e. between Year 10 and Year 12)          -0.972
## scaled_security                                                              -7.974
## scaled_rights                                                                -5.606
## scaled_health                                                                10.998
## scaled_social                                                                -3.932
##                                                                             Pr(>|t|)
## (Intercept)                                                                 0.215367
## emp_catHome duties, not otherwise employed                                  0.551978
## emp_catOther (please specify)                                               0.028496
## emp_catPart time employee (less than 30 hours a week)                       0.220694
## emp_catRetired / On a pension                                               0.000151
```

```
## emp_catSelf-employed                                                                0.025716
## emp_catStudent                                                                      0.023060
## emp_catUnemployed                                                                   1.12e-05
## edu_catDoctoral or equivalent                                                       0.667785
## edu_catLower secondary education (i.e. Year 9 or less)                              0.421157
## edu_catMaster or equivalent                                                         0.471927
## edu_catNo formal education                                                          0.681137
## edu_catPost-secondary non-tertiary education (e.g. apprenticeship or certificate) 0.959456
## edu_catPrimary education only                                                       0.372078
## edu_catUpper secondary education (i.e. between Year 10 and Year 12)                 0.331107
## scaled_security                                                                     2.91e-15
## scaled_rights                                                                       2.44e-08
## scaled_health                                                                        < 2e-16
## scaled_social                                                                       8.80e-05
##
## (Intercept)
## emp_catHome duties, not otherwise employed
## emp_catOther (please specify)                                                       *
## emp_catPart time employee (less than 30 hours a week)
## emp_catRetired / On a pension                                                       ***
## emp_catSelf-employed                                                                *
## emp_catStudent                                                                      *
## emp_catUnemployed                                                                   ***
## edu_catDoctoral or equivalent
## edu_catLower secondary education (i.e. Year 9 or less)
## edu_catMaster or equivalent
## edu_catNo formal education
## edu_catPost-secondary non-tertiary education (e.g. apprenticeship or certificate)
## edu_catPrimary education only
## edu_catUpper secondary education (i.e. between Year 10 and Year 12)
## scaled_security                                                                     ***
## scaled_rights                                                                       ***
## scaled_health                                                                       ***
## scaled_social                                                                       ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.812 on 1597 degrees of freedom
## Multiple R-squared:  0.2381, Adjusted R-squared:  0.2295
## F-statistic: 27.72 on 18 and 1597 DF,  p-value: < 2.2e-16
```

Regression Results

####Employment: Employment status appears to have a varied impact on quality of life. Individuals who are retired or on a pension report a higher quality of life, with a coefficient of 0.19920 and a highly significant p-value of 0.000151, implying that retirement may be associated with increased satisfaction, possibly due to more leisure time and less work-related stress. Part-time workers also report a better quality of life (coefficient: 0.076989) with a significant p-value (0.026904), which might suggest a balance between work and personal time that contributes positively to their overall well-being.

Conversely, unemployment is associated with a lower quality of life, as indicated by a negative coefficient of -0.353024 and a very significant p-value (1.12e-05). This is understandable as unemployment can lead to financial strain, social stigma, and psychological distress, all of which can detract from one's quality of life.

The coefficient for students is negative (-0.300322) with a significant p-value (0.023060). This suggests that

being a student is associated with a lower quality of life in the survey population. This finding can open up a discussion about the potential stressors associated with student life, such as academic pressure, financial difficulties due to tuition fees and living expenses, and perhaps a lack of work-life balance. It might also reflect a transitional life stage where students are still establishing their careers and social identities, which could impact their perceived quality of life.

The self-employed category also presents a negative coefficient (-0.184175) with a significant p-value (0.025716). This indicates that self-employment correlates with a somewhat lower quality of life. This result can be discussed in light of the challenges that self-employed individuals often face, such as income variability, lack of employment benefits, and the demands of managing one's own business. While self-employment can offer autonomy and flexibility, it can also come with increased responsibilities and uncertainty, which may adversely affect one's quality of life.

####Education: The impact of education on quality of life, as per the dataset, does not reach statistical significance. This result is intriguing and could be a subject of further discussion. It might point to a potential ceiling effect where, beyond a certain level, additional education does not translate to improved quality of life. Alternatively, it could indicate that in the UK context, other factors may play more pivotal roles in influencing quality of life than educational attainment alone.

####Security: Feeling secure is critically linked to quality of life. The dataset shows a strong negative relationship between the lack of security and quality of life, with a coefficient of -0.178545 and a very significant p-value (2.94e-15). As the survey produced results where the lower the number of the response - the more secure they are, hence represented in the negative coefficient.

####Human Rights (Respect): Respect for human rights is significantly associated with a better quality of life (coefficient: -0.118356, p-value: 5.56e-06) the survey produced results where the lower the number in the response indicates a greater amount of respect for human rights. This association could be discussed in terms of societal factors where individuals who perceive their rights as well-respected may feel more valued and supported within their community, which can enhance their perceived quality of life.

Health Access: Access to healthcare is a major determinant of quality of life, as indicated by the positive coefficient of 0.236538 and a highly significant p-value (2e-16). The ability to obtain necessary medical treatment without undue hardship is clearly a key component of overall well-being. This indicated through the higher coefficient, as the survey produced results where the higher the number reported for health care access, the less likely they have been denied or unable to access needed medicine.

Social - Value of friendships The dataset reveals a relationship between the value placed on social connections and the quality of life with a coefficient of -0.080459 and p-value of 8.80e-05, as in the response the lower the number reported - the higher value placed on friendships. A high value on social connections, such as relationships with family and friends, is correlated with an individual's quality of life. This is reflective of the well-documented view that robust social ties are essential for psychological well-being, providing support, a sense of belonging, and contributing to an individual's identity and purpose.

Validating Factor analysis

Factor analysis has assumptions including:

- Underlying latent trait
- Items are continuous measures (or conceptualised as continuous)
- Correlations are linear
- There are no outliers
- There is adequate data

To validate this dependent variable, it is assessed using validity and reliability where reliability is the measure of the latent trait with the least measurement error and validity is whether the measure actually represent what its supposed to.

To measure reliabilty, we examine the proportion of the variance of the predictor that is account for by variance in the latent variable. In World Values survey data, there is other variables expected to be associated with the latent variable. For example, Q56. Comparing your standard of living with your parent's standard of living when they were about your age, would you say that you are better off, worse off, or about the same?

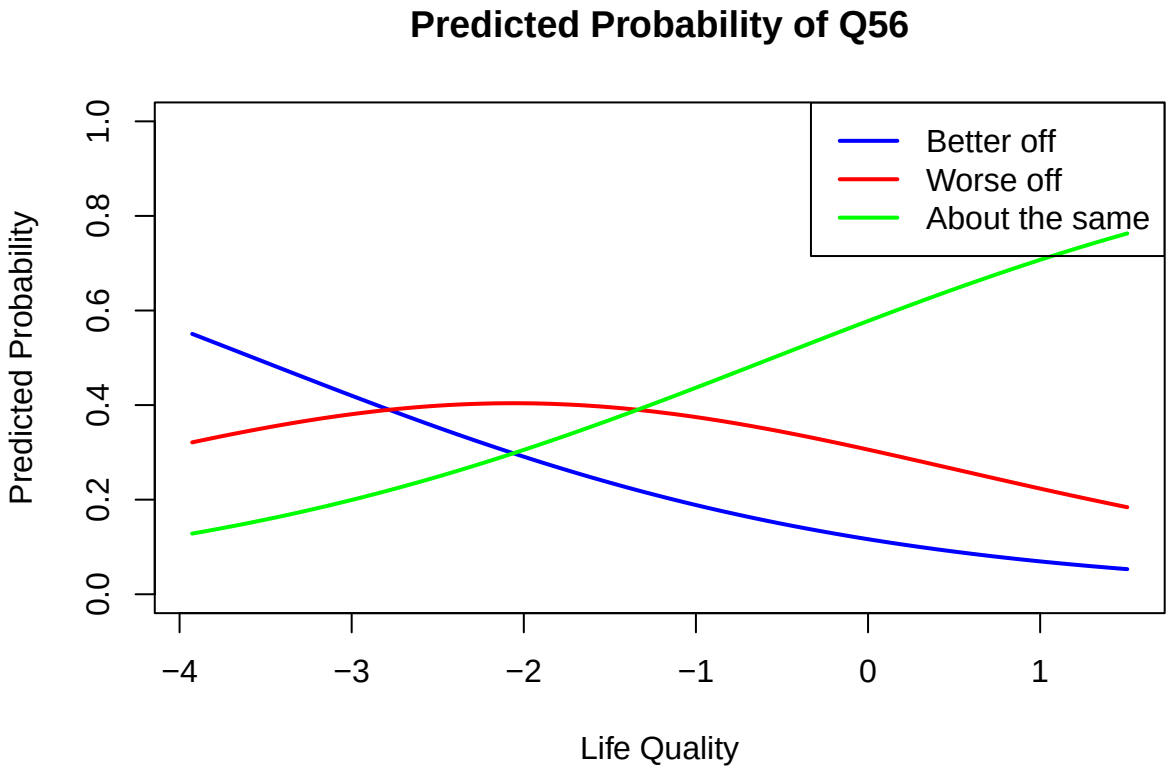
```
result <- polr(formula = Q56 ~life.quality, data = survey.data %>% mutate(Q56 = factor(Q56, levels = c(
result
```

```
## Call:
## polr(formula = Q56 ~ life.quality, data = survey.data %>% mutate(Q56 = factor(Q56,
##     levels = c("2", "3", "1"))))
##
## Coefficients:
## life.quality
##    0.5678809
##
## Intercepts:
##        2|3        3|1
## -2.0269912 -0.3135848
##
## Residual Deviance: 3166.618
## AIC: 3172.618
## (5 observations deleted due to missingness)
```

The results of the fitted proportional odds log regression model is presented above. The coefficient of 0.5679 is positive and indicates higher values of life quality associated with higher odds of moving to higher categories in Q56.

!! TODO fix this model lol its so ugly

```
# 1. Generate a sequence of values for life.quality
life_quality_seq <- seq(min(survey.data$life.quality), max(survey.data$life.quality), length.out = 100)

# 2. Compute predicted probabilities for each level of Q56 at each value of life.quality
predicted_probs <- predict(result, data.frame(life.quality = life_quality_seq), type = "probs")

# 3. Plot the predicted probabilities against life.quality for each level of Q56
plot(life_quality_seq, predicted_probs[, 1], type = "l", ylim = c(0, 1), xlab = "Life Quality", ylab =
lines(life_quality_seq, predicted_probs[, 2], type = "l", col = "red", lwd = 2)
lines(life_quality_seq, predicted_probs[, 3], type = "l", col = "green", lwd = 2)
# Add more lines if you have additional levels of Q56
legend("topright", legend = c("Better off", "Worse off", "About the same"), col = c("blue", "red", "gre
```



We'd assume people with people with high quality of life, they should be the same or higher quality than their parents. This relationship can be seen in the graph as the quality of life is better than parents increases dramatically with quality of life. Those with lower life quality demonstrate low predicted probabilities below 20% to say they are living off better than their parents. This strong relationship is a good demonstration of reliability

Inter-item reliability: the consistency between multiple items measuring the same construct, measured using Cronbach's alpha.

```
alpha(survey.data[,c("happiness",
                         "health",
                         "finances",
                         "satisfaction",
                         "freedom")])
```

```
##
## Reliability analysis
## Call: alpha(x = survey.data[, c("happiness", "health", "finances",
##     "satisfaction", "freedom")])
##
##   raw_alpha std.alpha G6(smc) average_r S/N    ase mean  sd median_r
##       0.77      0.81    0.79      0.46 4.3 0.0069  5.8 1.2     0.44
##
##     95% confidence boundaries
##          lower alpha upper
## Feldt     0.75  0.77  0.78
## Duhachek  0.75  0.77  0.78
##
##  Reliability if an item is dropped:
##              raw_alpha std.alpha G6(smc) average_r S/N alpha se  var.r med.r
```