GMS6025C: Final Project 1 Part 3 Modeling

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About the data

Name: Addiction Patient Assessment Measures

Description: Data are gathered from a residential treatment facility for substance use disorders. Data include item-level responses for all questionnaires listed below. Data are available at initiation of treatment, after one month of treatment, and at treatment discharge.

Overview of variables in the data

- Variables that end in `.BL`, `.FU`, `.DC` are indicating that the score was collected at baseline before treatment, 30 days following up after baseline, and during discharge respectively.

Independent variables

Basic Demographics

- age
  - `age`
- gender
  - `gender`
- education
  - `education`
- number of days sober
  - `sober_days`
- If a patient dropped out of the program or not
  - `dropout_yn`

Substance use disorders

- Flag of whether or not the patient is being treated for substance in name
  - `SUD_is_Alchohol`
  - `SUD_is_Opioid`
  - `SUD_is_Cannabis`
  - `SUD_is_depressants_anxiolytic`
  - `SUD_is_Cocaine`
  - `SUD_is_Other_stimulant`
  - `SUD_is_Hallucinogen`
  - `SUD_is_Nicotine`
  - `SUD_is_Inhalant`
  - `SUD_is_psychoactive`
- Number of substances being treated for
  - Total number of all substances that patient is being treated for

    - * SUD.sum
  - Total number of legal substances that patient is being treated for. (SUD_is_Alchohol, SUD_is_Cannabis, SUD_is_Nicotine, SUD_is_Inhalant)
    - * SUD.sum_legal
  - Total number of legal substances that patient is being treated for. (SUD_is_Opioid, SUD_is_depressants_anxiolytic, SUD_is_Cocaine, SUD_is_Other_stimulant, SUD_is_psychoactive, SUD_is_Hallucinogen)
    - * SUD.sum_illegal
- Flag of whether or not the patient is being treated for legal or illegals substances
  - If patient is being treated for any of the following: SUD_is_Alchohol, SUD_is_Cannabis, SUD_is_Nicotine, SUD_is_Inhalant
    - * SUD.uses_legal
  - If patient is being treated for any of the following: SUD_is_Opioid, SUD_is_depressants_anxiolytic, SUD_is_Cocaine, SUD_is_Other_stimulant, SUD_is_psychoactive, SUD_is_Hallucinogen
    - * SUD.uses_illegal

Beliefs about AA/NA (TSPEQ)

- Categories based on number of AA/NA meetings attended throughout life
  - aana_life
- Categories based on number of AA/NA meetings attended last year
  - aana_pastyear
- Total score of questions gauging positive opinions of AA/NA
  - aana_positive
- Total score of questions gauging negative opinions of AA/NA
  - aana_negative

Childhood Experiences (ACE)

- Binary flags of whether the specified type of negative experience happened during childhood of patient
  - childhood.verbal_abuse
  - childhood.physical_abuse
  - childhood.sexual_abuse
  - childhood.alone
  - childhood.neglected
  - childhood.divorced
  - childhood.parent_was_abused
  - childhood.other_was_addicted
  - childhood.other_was_stressed
  - childhood.other_was_prisoned
- Sum of number of types of negative experiences that happened during patient's childhood
  - childhood_sum

Social Support (MSPSS)

- Total score for questions that measure the perceived level of social support the respondent receives from each of the three subcategories:
  - family
    - * social.family
  - friends
    - * social.friends
  - significant other
    - * social.sig_other
  - Sum of family, friends, and significant other
    - * social

Spiritual Experiences (Brief R-COPE)

- Total score of questions asking the frequency of spiritual coping experience, ranging from 0) Not at all to 3) Nearly every day.
  - Positive coping
    - `religion_pos`
  - Negative coping
    - `religion_neg`
- Religion
  - Binary flag of if a patient practices religion that is in the name of the variable
    - `rel.is_Atheist`
    - `rel.is_Agnostic`
    - `rel.is_Protestant`
    - `rel.is_Catholic`
    - `rel.is_Muslim`
    - `rel.is_Jewish`
    - `rel.is_Hindu`
    - `rel.is_Buddhist`
    - `rel.is_Baptist`
    - `rel.is_No_affiliation`
    - `rel.is_Non_denominational_Christian`
    - `rel.is_Other`
  - Binary flag of if patient is religious or not
    - `rel.is_religious`
    - `rel.is_not_religious`

Stressful Life Experiences (LEC-5)

- Binary flags of whether a listed stressful life event was either 1) experienced the life event personally, 2) witnessed it happen to someone else, 3) learned about it happening from a close friend or family member, 4) experienced the event due to their job.
  - Natural disaster
    - `stress.natural_disaster.to_subj`
    - `stress.natural_disaster.witnessed`
    - `stress.natural_disaster.learned`
    - `stress.natural_disaster.exposed`
  - Fire or explosion
    - `stress.fire.to_subj`
    - `stress.fire.witnessed`
    - `stress.fire.learned`
    - `stress.fire.exposed`
  - Transportation accident
    - `stress.transportation_accident.to_subj`
    - `stress.transportation_accident.witnessed`
    - `stress.transportation_accident.learned`
    - `stress.transportation_accident.exposed`
  - Non-transportation accident
    - `stress.serious_accident.to_subj`
    - `stress.serious_accident.witnessed`
    - `stress.serious_accident.learned`
    - `stress.serious_accident.exposed`
  - Exposure to toxic substance
    - `stress.toxic.to_subj`
    - `stress.toxic.witnessed`
    - `stress.toxic.learned`

    * stress.toxic.exposed
- Physically assaulted
    * stress.physical_assault.to_subj
    * stress.physical_assault.witnessed
    * stress.physical_assault.learned
    * stress.physical_assault.exposed
- Assaulted with a weapon
    * stress.weapon_assault.to_subj
    * stress.weapon_assault.witnessed
    * stress.weapon_assault.learned
    * stress.weapon_assault.exposed
- Sexual assault
    * stress.sexual_assault.to_subj
    * stress.sexual_assault.witnessed
    * stress.sexual_assault.learned
    * stress.sexual_assault.exposed
- Unwanted or uncomfortable sexual experience.
    * stress.unwanted_sexual.to_subj
    * stress.unwanted_sexual.witnessed
    * stress.unwanted_sexual.learned
    * stress.unwanted_sexual.exposed
- Combat or exposure to war-zone
    * stress.combat.to_subj
    * stress.combat.witnessed
    * stress.combat.learned
    * stress.combat.exposed
- Captivity
    * stress.captivity.to_subj
    * stress.captivity.witnessed
    * stress.captivity.learned
    * stress.captivity.exposed
- Life-threatening illness or injury.
    * stress.illness.to_subj
    * stress.illness.witnessed
    * stress.illness.learned
    * stress.illness.exposed
- Severe human suffering.
    * stress.severe_suffering.to_subj
    * stress.severe_suffering.witnessed
    * stress.severe_suffering.learned
    * stress.severe_suffering.exposed
- Sudden violent death (for example, homicide, suicide).
    * stress.sudden_violent_death.to_subj
    * stress.sudden_violent_death.witnessed
    * stress.sudden_violent_death.learned
    * stress.sudden_violent_death.exposed
- Sudden accidental death.
    * stress.sudden_accidental_death.to_subj
    * stress.sudden_accidental_death.witnessed
    * stress.sudden_accidental_death.learned
    * stress.sudden_accidental_death.exposed
- Serious injury, harm, or death you caused to someone else.
    * stress.harm_to_others.to_subj
    * stress.harm_to_others.witnessed

    * stress.harm_to_others.learned
    * stress.harm_to_others.exposed
  - Any other very stressful event or experience.
    * stress.other.to_subj
    * stress.other.witnessed
    * stress.other.learned
    * stress.other.exposed
  - Total score of number of catgories that happened to the patient personally and/or witnessed happend to someone else
    * stress_to_subj
    * stress_to_subj_and_wit
    * stress_wit

Substance use history

- Binary flag of whether or not patient has used the following:
  - Tobacco
    * history.tobacco
  - Alcohol
    * history.alcohol
  - Other
    * history.other

Dependent variables

Length of stay in treatment

- number of days in treatment
  - treatment_days

Alcohol/Drug Craving (PACS)

- Total score that assesses the alcohol/drug cravings the patient has experienced within the past week based on a variety of craving characteristics.
  - craving.BL
  - craving.FU
  - craving.DC

Quality of Life (WHOQOL-BREF)

- Total scores of assessment that measures different aspects of quality of life
  - general
    * qol_general_health.BL
    * qol_general_health.FU
    * qol_general_health.DC
  - physical
    * qol_physical.BL
    * qol_physical.FU
    * qol_physical.DC
  - psychological health
    * qol_psych.BL
    * qol_psych.FU
    * qol_psych.DC
  - social relationships
    * qol_social.BL

        * qol_social.FU
        * qol_social.DC
    - environment
        * qol_env.BL
        * qol_env.FU
        * qol_env.DC
    - Total scores
        * qol.BL
        * qol.FU
        * qol.DC
    - Recalculating quality of life scores without social component
        * no_social_qol.BL

Commitment to Sobriety (CSS-5)

- Total score of questions gauging patient's commitment to abstinence from alcohol and drug use
    - commit.BL
    - commit.DC
    - commit.FU
- The difference of commitment to sobriety score between discharge and baseline
    - commit_change

Alcohol/Drug Abstinence Experiences (DAASE)

- Total score of questions that assesses patient's self-confidence in their ability to remain abstinent from alcohol in various situations.
    - Negative Affect
        * abstain_neg.BL
        * abstain_neg.FU
        * abstain_neg.DC
    - Social/Positive
        * abstain_pos.BL
        * abstain_pos.FU
        * abstain_pos.DC
    - Physical ailments
        * abstain_phy.BL
        * abstain_phy.FU
        * abstain_phy.DC
    - Situations associated with cravings
        * abstain_crv.BL
        * abstain_crv.FU
        * abstain_crv.DC
    - All previously mentioned conditions
        * abstain_total.BL
        * abstain_total.FU
        * abstain_total.DC

```
cleaned_addiction_data = read_rds("./addiction.rds")
```

First hypothesis:

```
commitment_model <- lm(commit_change ~ age
                + gender
                + education
```

```
                + rel.is_religious
                + religion_pos
                + aana_past_year
                + SUD.sum_illegal
                + SUD.sum_legal
                ,cleaned_addiction_data)
```

$$\begin{aligned}\hat{y} = \beta_0 &+ \beta_{Age} Age \\ &+ \beta_{Male} Male? \\ &+ \beta_{EduAA} EduAA? + \beta_{EduBS} EduBS? + \beta_{EduMS} EduMS? + \beta_{EduPhD} EduPhD? \\ &+ \beta_{Religious} Religious? + \beta_{PositiveReligion} PositiveReligion \\ &+ \beta_{AANAParticipation} AANAParticipation \\ &+ \beta_{NumIllegal} NumIllegal + \beta_{NumIllegal} NumIllegal\end{aligned}$$

$$\begin{aligned}P(A \cup B) &= P(A) + P(B) - P(A \cap B) \\ &= 0.5 + 0.2 - 0.3 \qquad\qquad] \\ &= 0.4\end{aligned}$$

```
summary(commitment_model)
```

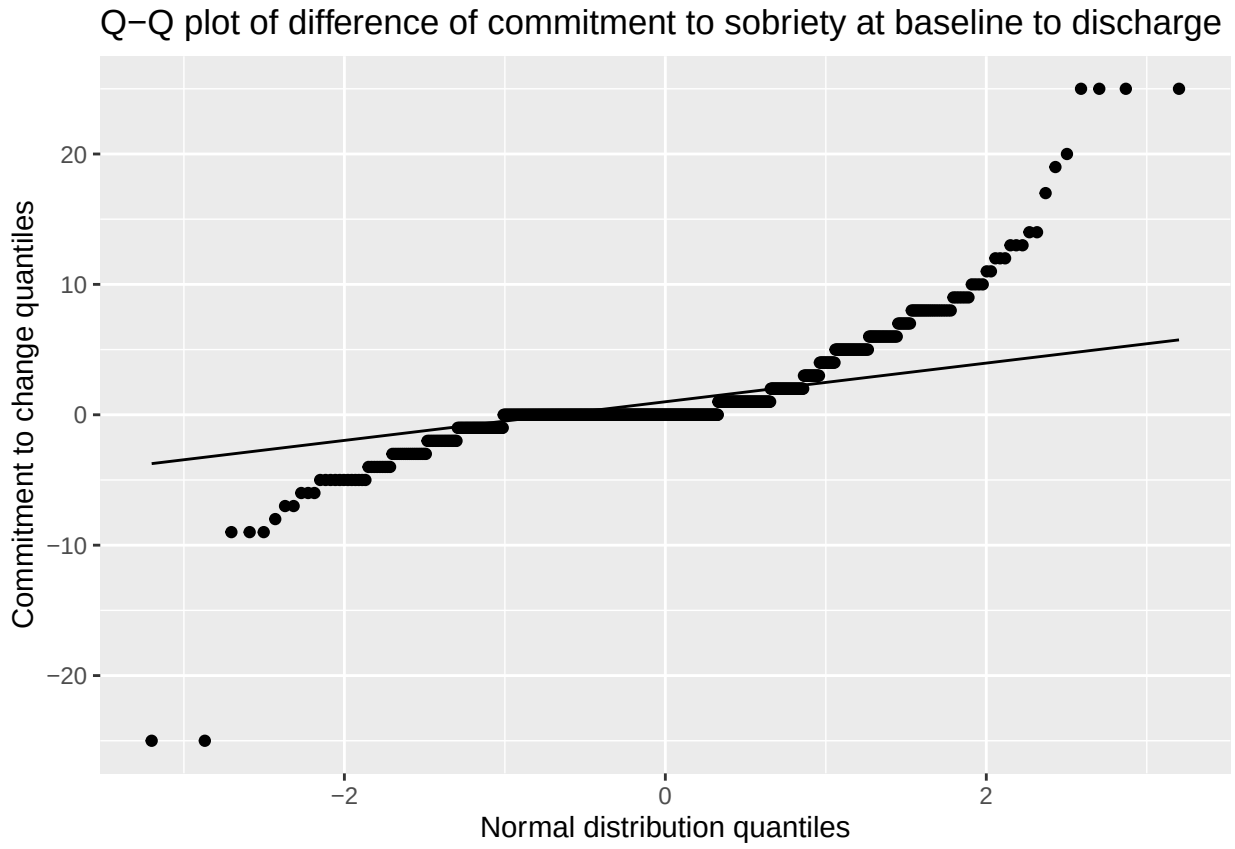
```
##
## Call:
## lm(formula = commit_change ~ age + gender + education + rel.is_religious +
##     religion_pos + aana_past_year + SUD.sum_illegal + SUD.sum_legal,
##     data = cleaned_addiction_data)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -25.931  -1.577  -0.658   0.664  24.143
##
## Coefficients:
##                                  Estimate Std. Error t value Pr(>|t|)
## (Intercept)                       0.79804    0.74149    1.08    0.282
## age                              -0.00323    0.01212   -0.27    0.790
## gendermen                         0.26263    0.31894    0.82    0.411
## educationAssociate's/Some College -0.39753    0.43830   -0.91    0.365
## educationBachelor's               -0.88462    0.41071   -2.15    0.032 *
## educationMaster's                 -0.53454    0.63980   -0.84    0.404
## educationDoctoral                 -0.51251    0.55629   -0.92    0.357
## rel.is_religiousTRUE               0.67802    0.37015    1.83    0.067 .
## religion_pos                      -0.04861    0.02377   -2.04    0.041 *
## aana_past_year0.25                -0.14234    0.32310   -0.44    0.660
## aana_past_year0.5                  0.26548    0.65151    0.41    0.684
## aana_past_year0.75                -0.60564    0.75880   -0.80    0.425
## aana_past_year1                   -1.06685    0.80619   -1.32    0.186
## SUD.sum_illegal                    0.19176    0.14102    1.36    0.174
## SUD.sum_legal                      0.52078    0.20610    2.53    0.012 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
```

```
## Residual standard error: 3.93 on 715 degrees of freedom
## Multiple R-squared:  0.0358, Adjusted R-squared:  0.0169
## F-statistic: 1.89 on 14 and 715 DF,  p-value: 0.024
```

- Hypothesis: Individuals with higher involvement in AA/NA activities will show a greater increase in their CSS-5 relative change scores.

Looking to see if difference of commitment to sobriety from baseline to discharge is normally distributed

```
# and now the Q-Q plots
cleaned_addiction_data |>
  ggplot(aes(sample=commit_change)) +
  stat_qq() +
  stat_qq_line() +
  labs(
    title = "Q-Q plot of difference of commitment to sobriety at baseline to discharge",
    y = "Commitment to change quantiles",
    x = "Normal distribution quantiles")
```

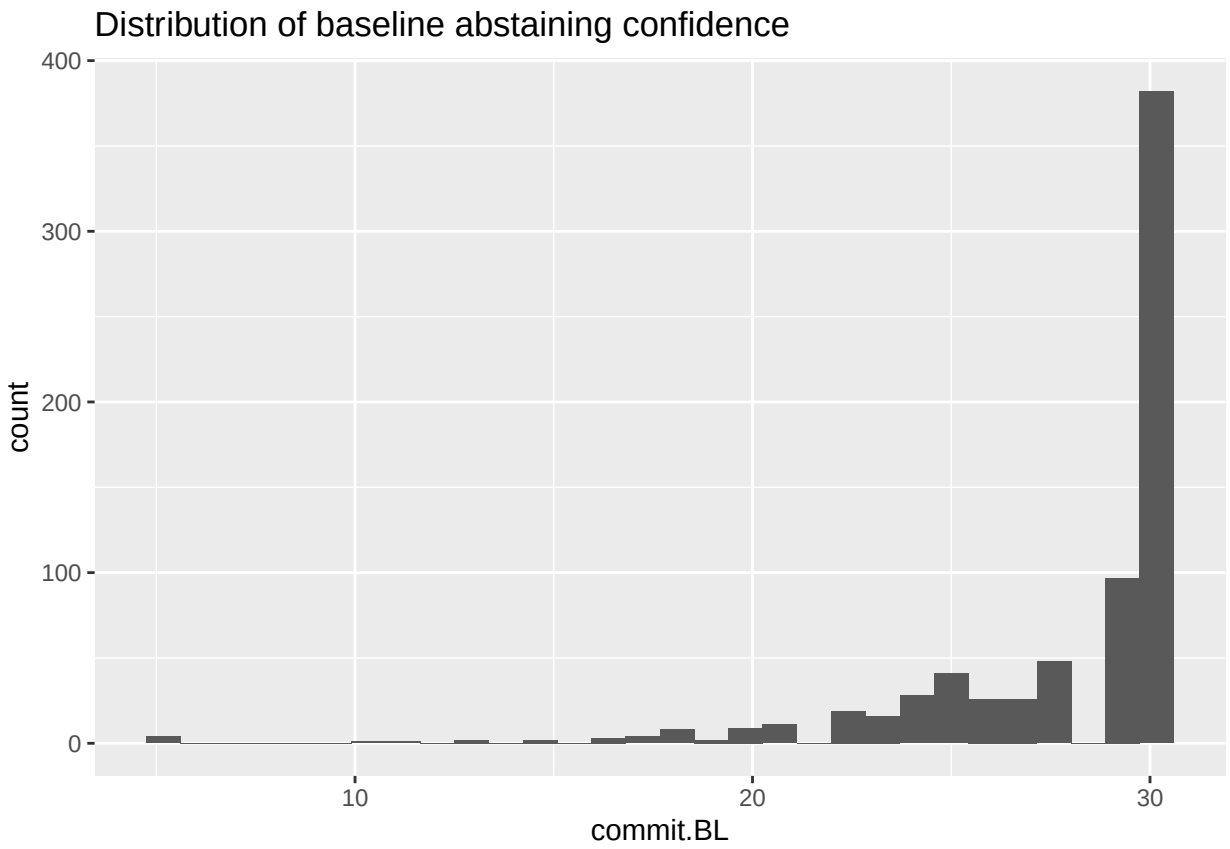


Looking to see if difference of commitment to sobriety from baseline to discharge is normally distributed

```
# and now the Q-Q plots
cleaned_addiction_data |>
  ggplot(aes(commit.BL)) +
```

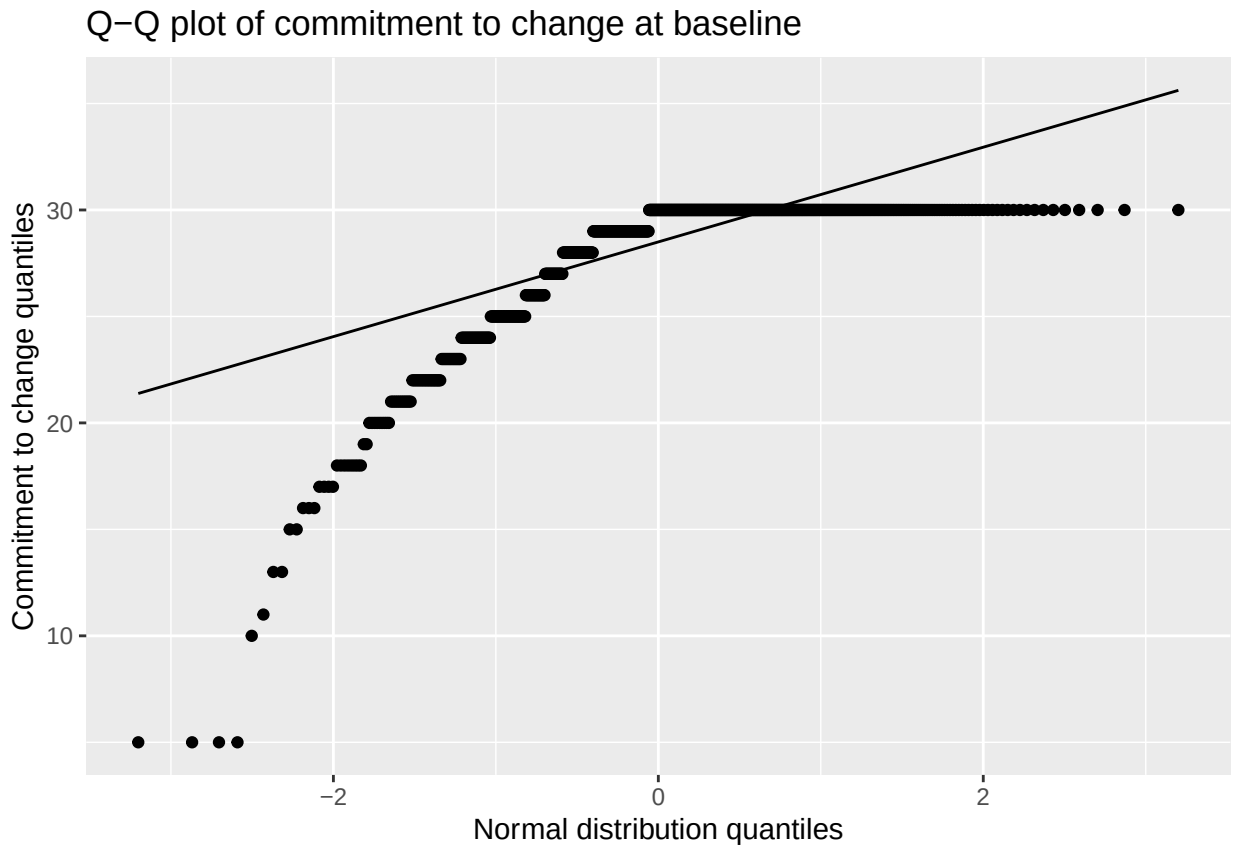
```
  geom_histogram() +
  labs(
    title = "Distribution of baseline abstaining confidence")
```

```
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
```



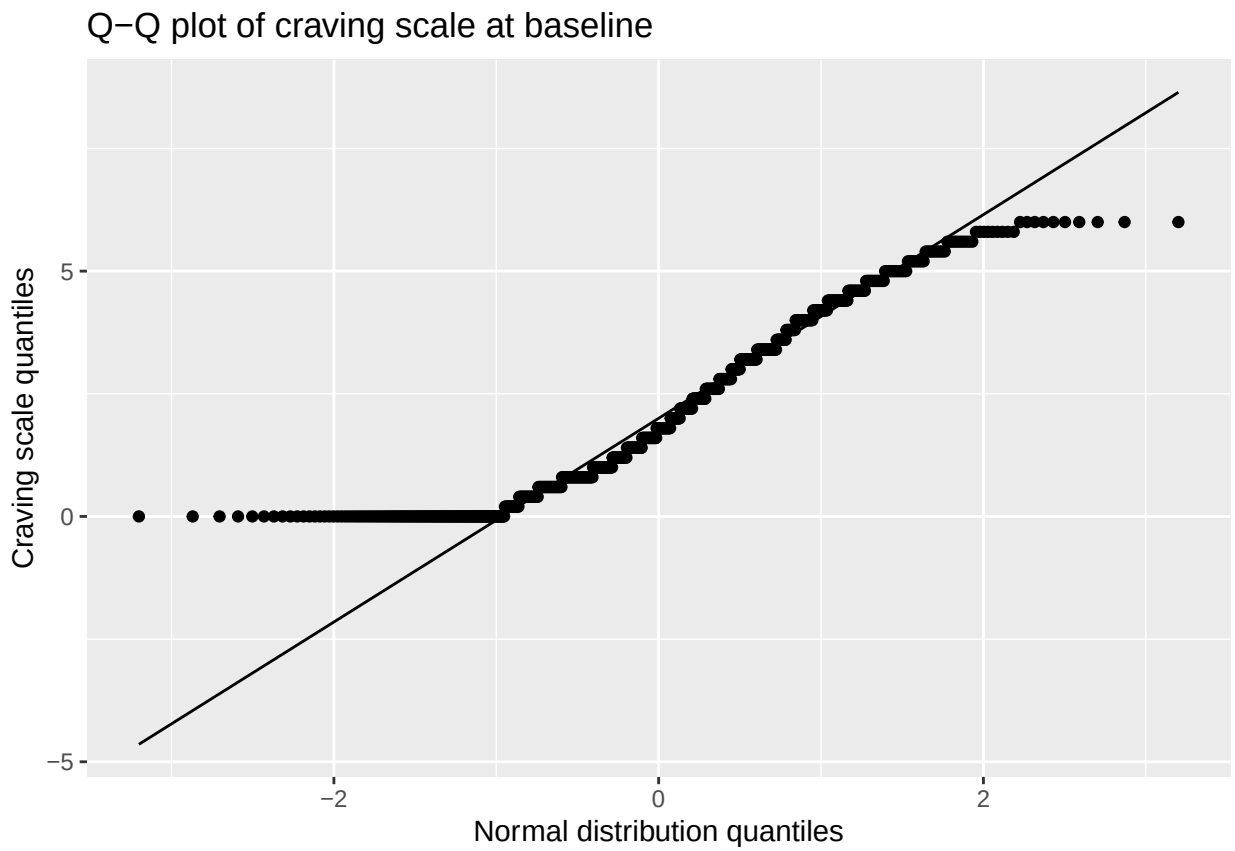
Looking to see if difference of commitment to sobriety from baseline to discharge is normally distributed

```
# and now the Q-Q plots
cleaned_addiction_data |>
  ggplot(aes(sample=commit.BL)) +
  stat_qq() +
  stat_qq_line() +
  labs(
    title = "Q-Q plot of commitment to change at baseline",
    y = "Commitment to change quantiles",
    x = "Normal distribution quantiles")
```

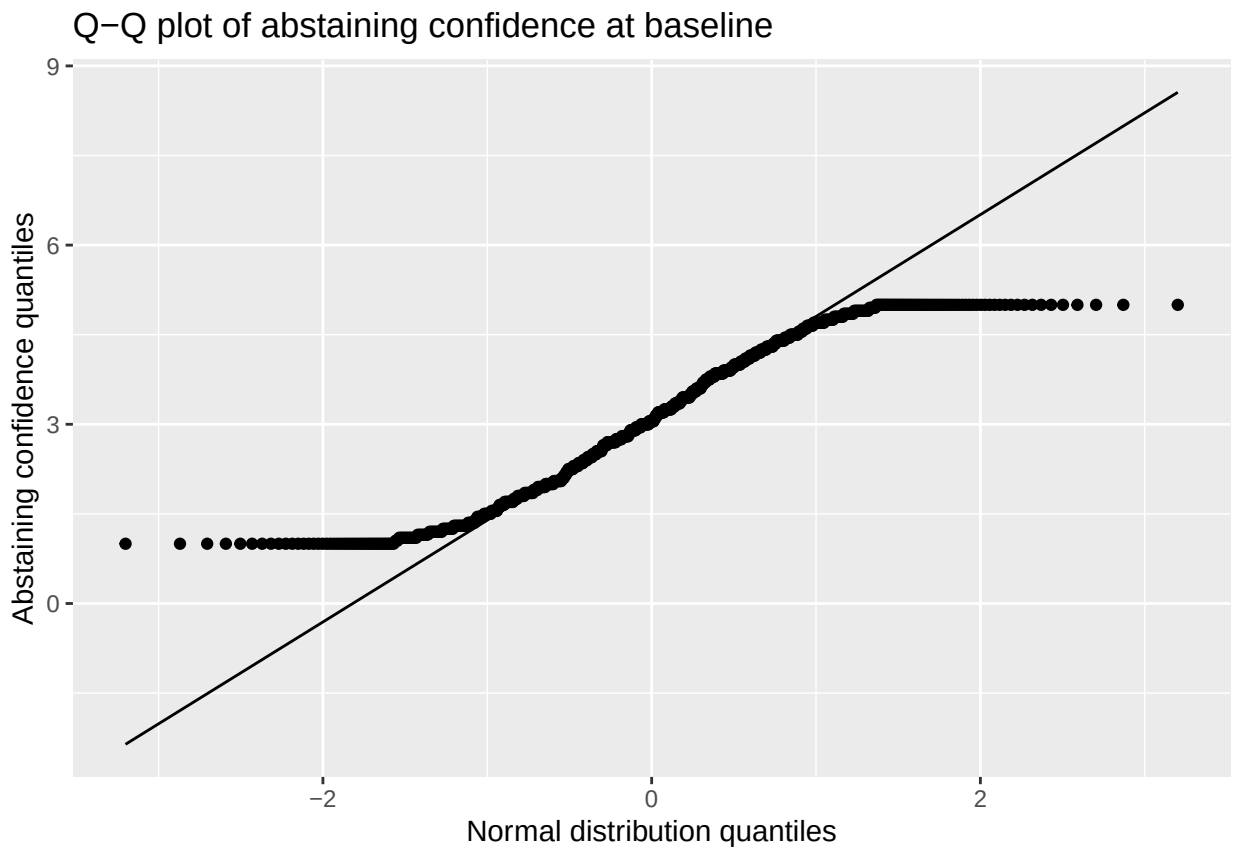


Looking for other normally distributed things to predict

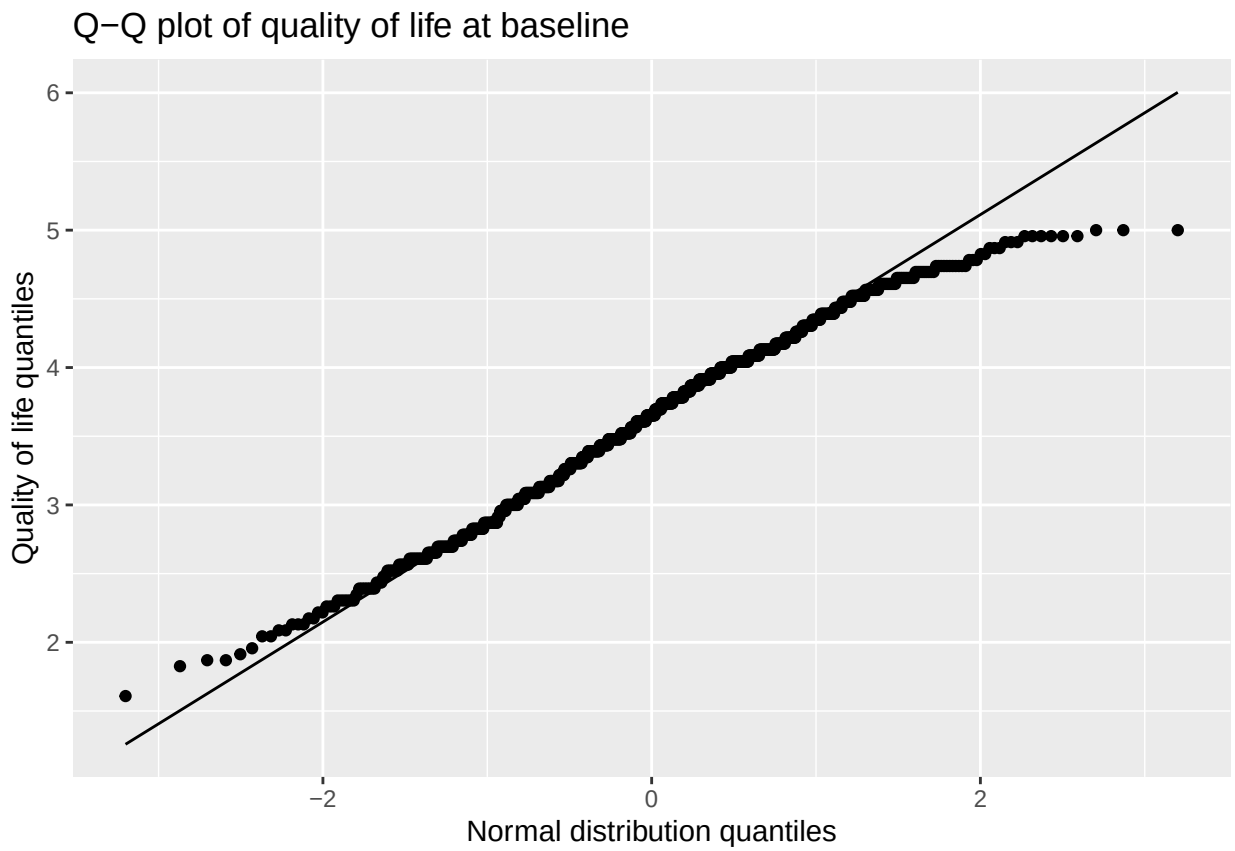
```
# and now the Q-Q plots
cleaned_addiction_data |>
  ggplot(aes(sample=craving.BL)) +
  stat_qq() +
  stat_qq_line() +
  labs(
    title = "Q-Q plot of craving scale at baseline",
    y = "Craving scale quantiles",
    x = "Normal distribution quantiles")
```




```
# and now the Q-Q plots
cleaned_addiction_data |>
  ggplot(aes(sample=abstain_total.BL)) +
  stat_qq() +
  stat_qq_line() +
  labs(
    title = "Q-Q plot of abstaining confidence at baseline",
    y = "Abstaining confidence quantiles",
    x = "Normal distribution quantiles")
```

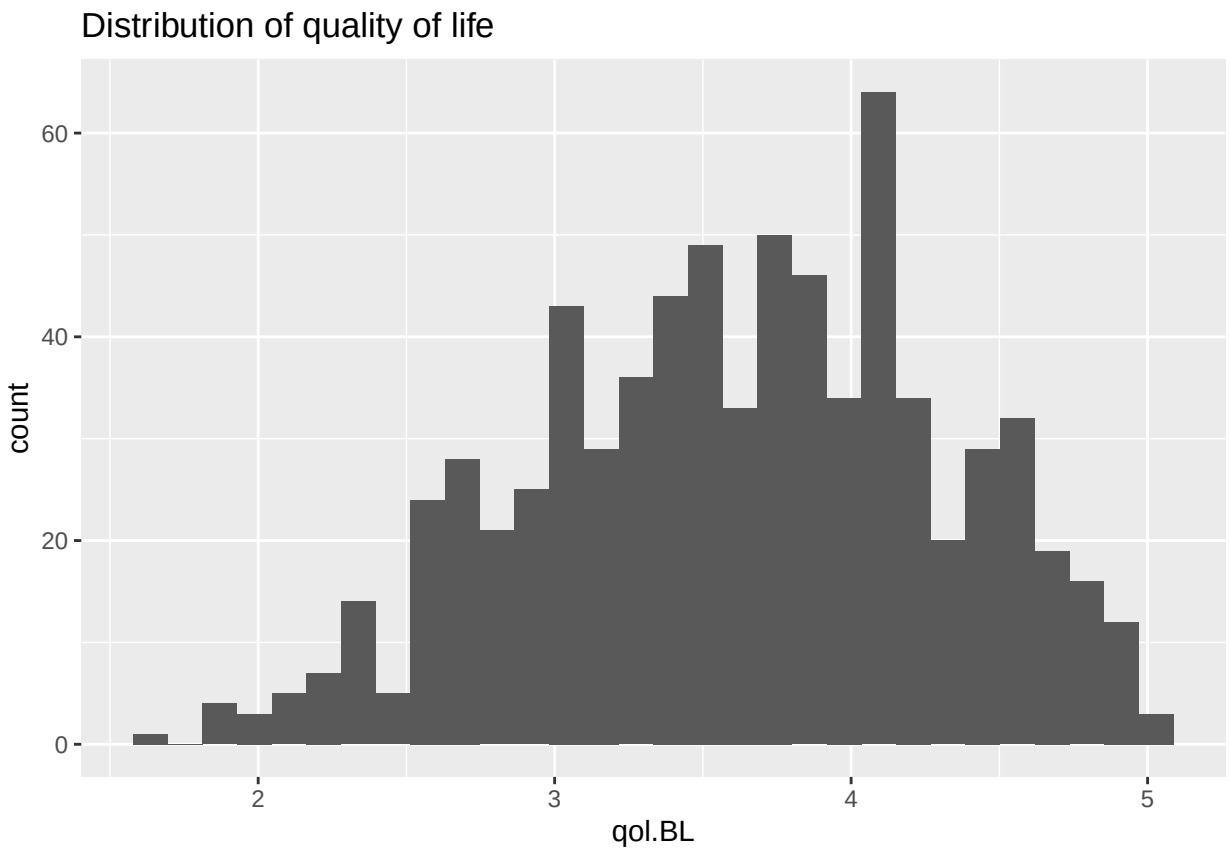



```
# and now the Q-Q plots
cleaned_addiction_data |>
  ggplot(aes(sample=qol.BL)) +
  stat_qq() +
  stat_qq_line() +
  labs(
    title = "Q-Q plot of quality of life at baseline",
    y = "Quality of life quantiles",
    x = "Normal distribution quantiles")
```

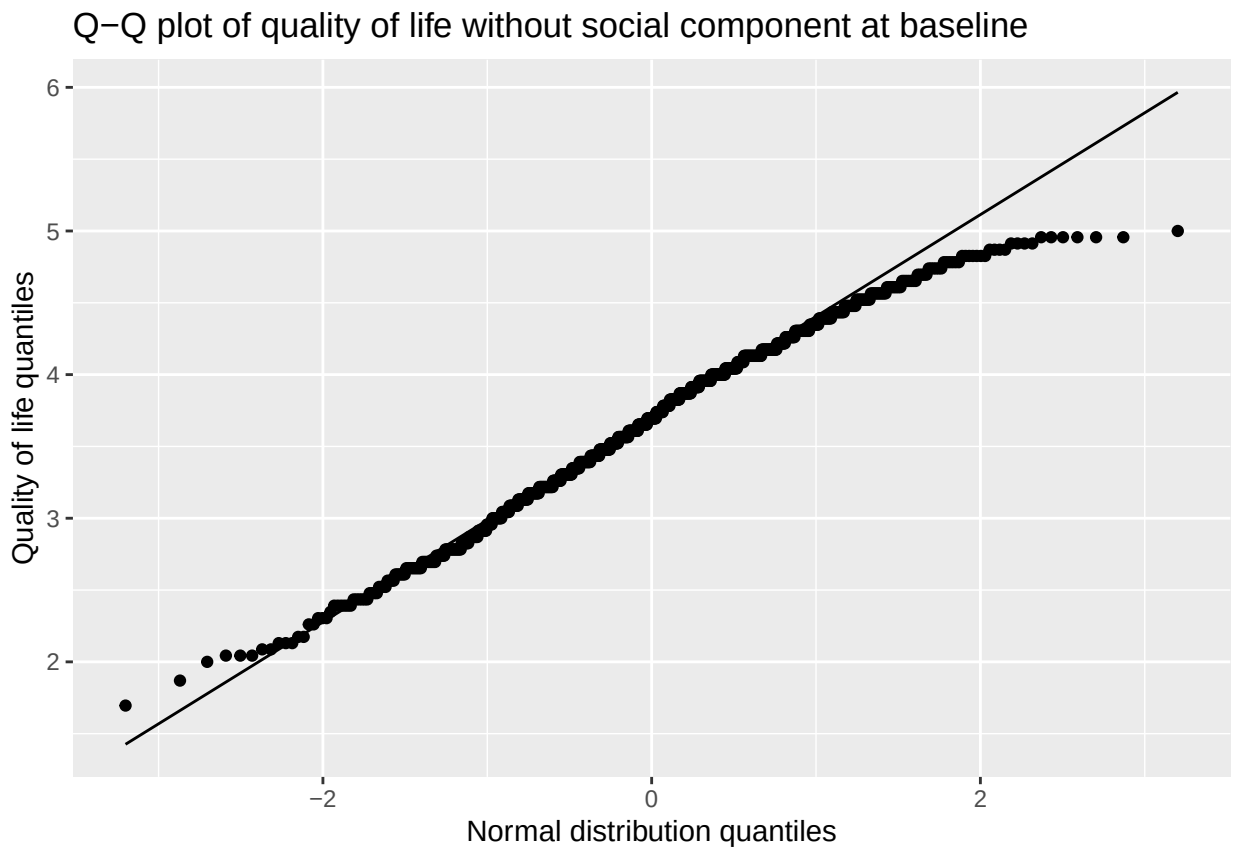



```
# and now the Q-Q plots
cleaned_addiction_data |>
  ggplot(aes(qol.BL)) +
  geom_histogram() +
  labs(
    title = "Distribution of quality of life")
```

```
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
```

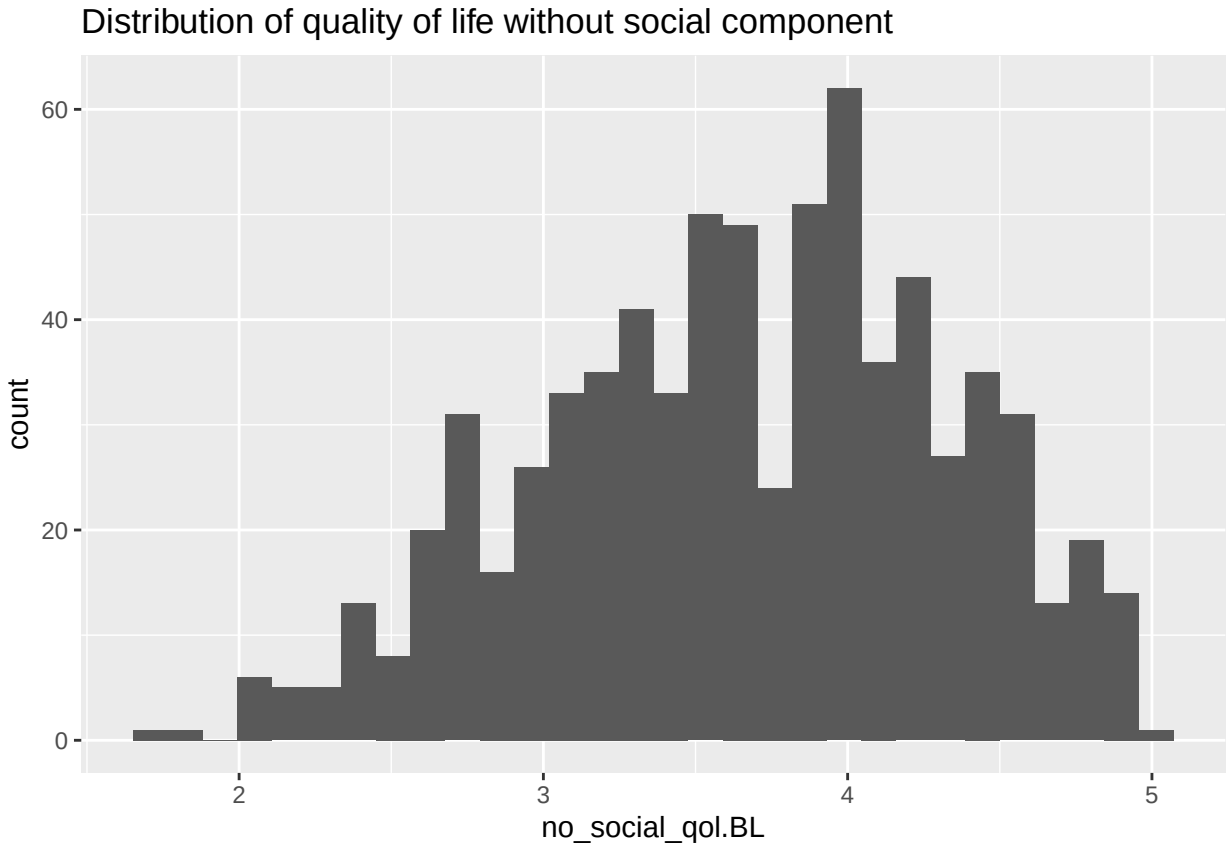



```
# and now the Q-Q plots
cleaned_addiction_data |>
  ggplot(aes(sample=no_social_qol.BL)) +
  stat_qq() +
  stat_qq_line() +
  labs(
    title = "Q-Q plot of quality of life without social component at baseline",
    y = "Quality of life quantiles",
    x = "Normal distribution quantiles")
```




```
# and now the Q-Q plots
cleaned_addiction_data |>
  ggplot(aes(no_social_qol.BL)) +
  geom_histogram() +
  labs(
    title = "Distribution of quality of life without social component")
```

```
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
```



Second hypothesis

```
qol_model <- lm(no_social_qol.BL ~ age
                + gender
                + education
                + SUD.sum_illegal
                + SUD.sum_legal
                + rel.is_religious
                + religion_pos
                + aana_past_year
                + aana_positive
                + social
                + stress_to_subj
                ,cleaned_addiction_data)
```

```
summary(qol_model)
```

```
##
## Call:
## lm(formula = no_social_qol.BL ~ age + gender + education + SUD.sum_illegal +
##     SUD.sum_legal + rel.is_religious + religion_pos + aana_past_year +
##     aana_positive + social + stress_to_subj, data = cleaned_addiction_data)
```

```
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -1.7143 -0.3570  0.0526  0.3822  1.5135
##
## Coefficients:
##                                   Estimate Std. Error t value  Pr(>|t|)
## (Intercept)                        2.83343    0.18707   15.15   < 2e-16 ***
## age                                0.00244    0.00175    1.40    0.1630
## gendermen                          0.08085    0.04582    1.76    0.0781 .
## educationAssociate's/Some College -0.07360    0.06284   -1.17    0.2419
## educationBachelor's                0.18656    0.06000    3.11    0.0019 **
## educationMaster's                 -0.10187    0.09169   -1.11    0.2669
## educationDoctoral                  0.07630    0.07965    0.96    0.3384
## SUD.sum_illegal                   -0.04030    0.02017   -2.00    0.0462 *
## SUD.sum_legal                     -0.01887    0.02949   -0.64    0.5225
## rel.is_religiousTRUE              -0.04346    0.05299   -0.82    0.4124
## religion_pos                       0.01671    0.00347    4.81 0.0000018 ***
## aana_past_year0.25                -0.02551    0.04746   -0.54    0.5911
## aana_past_year0.5                 -0.01761    0.09531   -0.18    0.8534
## aana_past_year0.75                 0.12654    0.11281    1.12    0.2623
## aana_past_year1                    0.04958    0.11818    0.42    0.6750
## aana_positive                     -0.01472    0.00375   -3.92 0.0000971 ***
## social                             0.19089    0.01853   10.30   < 2e-16 ***
## stress_to_subj                    -0.03988    0.00891   -4.48 0.0000089 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.561 on 712 degrees of freedom
## Multiple R-squared:  0.304,  Adjusted R-squared:  0.287
## F-statistic: 18.3 on 17 and 712 DF,  p-value: <2e-16
```

```
Anova(qol_model, type=2, digits=4) |>
tidy() |>
  kable()
```

```
## Warning in printHypothesis(L, rhs, names(b)): one or more coefficients in the hypothesis include
##      arithmetic operators in their names;
##   the printed representation of the hypothesis will be omitted
```

term	sumsq	df	statistic	p.value
age	0.61383	1	1.95010	0.16301
gender	0.97971	1	3.11249	0.07812
education	7.80550	4	6.19940	0.00007
SUD.sum_illegal	1.25583	1	3.98969	0.04616
SUD.sum_legal	0.12888	1	0.40945	0.52245
rel.is_religious	0.21174	1	0.67269	0.41239
religion_pos	7.29317	1	23.16997	0.00000
aana_past_year	0.67150	4	0.53333	0.71129
aana_positive	4.83695	1	15.36669	0.00010
social	33.41702	1	106.16390	0.00000

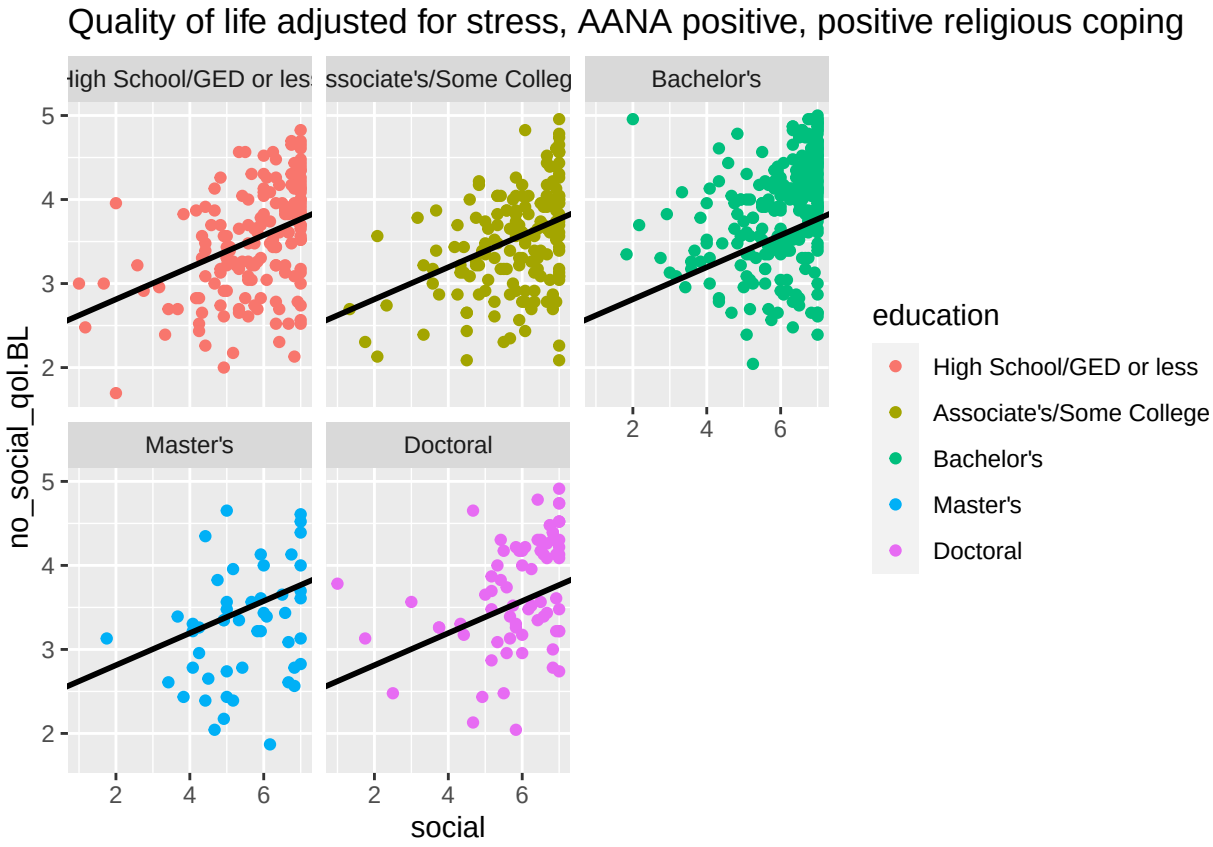
term	sumsq	df	statistic	p.value
stress_to_subj	6.30376	1	20.02669	0.00001
Residuals	224.11497	712	NA	NA

Plotting the adjusted data

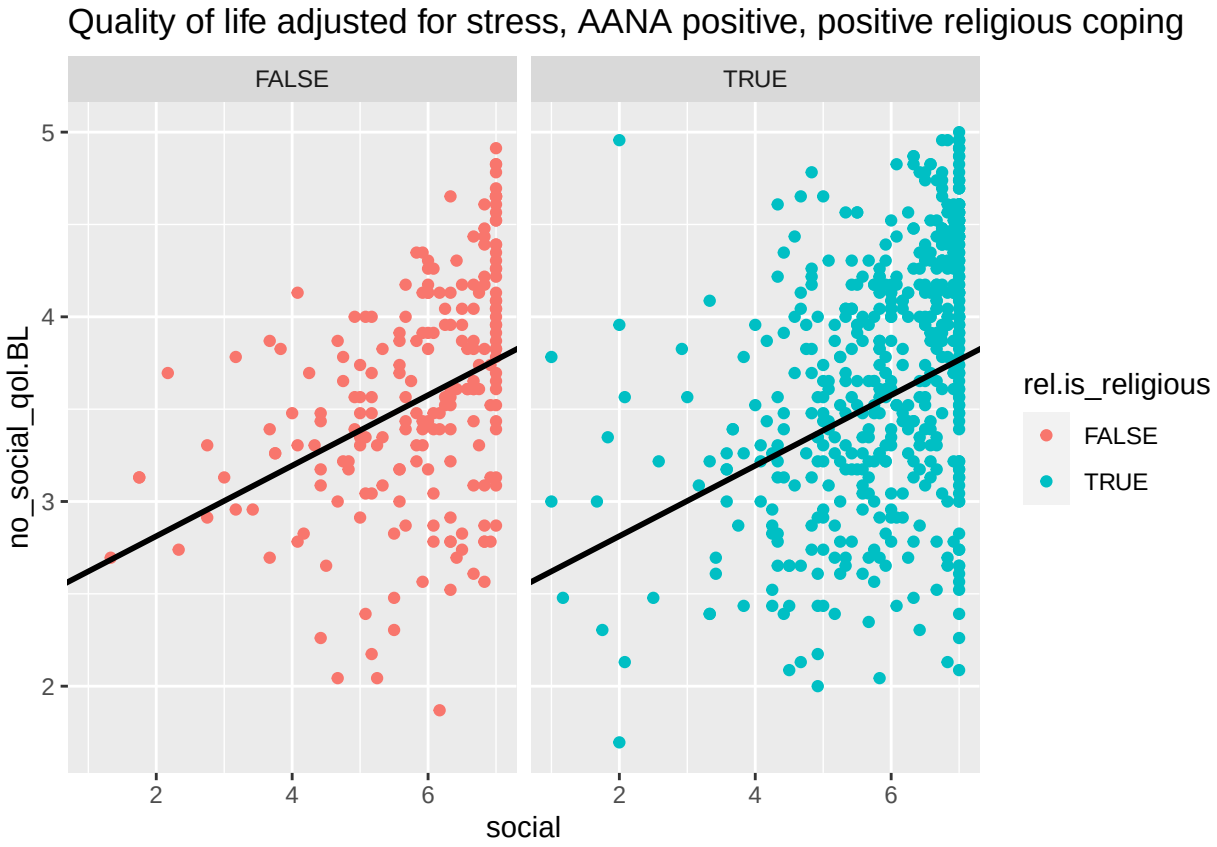
```
tidy_qol_model <- tidy(qol_model)

# Getting the slope and intercept for perceived social support
coef_social <-
  pull(filter(tidy_qol_model,
              term == "social"),
       estimate)

intercept <- pull(filter(tidy_qol_model, term == "(Intercept)"), estimate)

# Getting the slope of the other variables

stress_to_subj_slope <- pull(filter(tidy_qol_model, term == "stress_to_subj"), estimate)
aana_positive_slope <- pull(filter(tidy_qol_model, term == "aana_positive"), estimate)
religion_pos_slope <- pull(filter(tidy_qol_model, term == "religion_pos"), estimate)

# Getting the mean of other variables

stress_to_subj_mean <- cleaned_addiction_data |>
  summarize(Mean = mean(stress_to_subj)) |>
  pull(Mean)

aana_positive_mean <- cleaned_addiction_data |>
  summarize(Mean = mean(aana_positive)) |>
  pull(Mean)

religion_pos_mean <- cleaned_addiction_data |>
  summarize(Mean = mean(religion_pos)) |>
  pull(Mean)
```

- Based on the following formula:
- We are adjusting for other things.

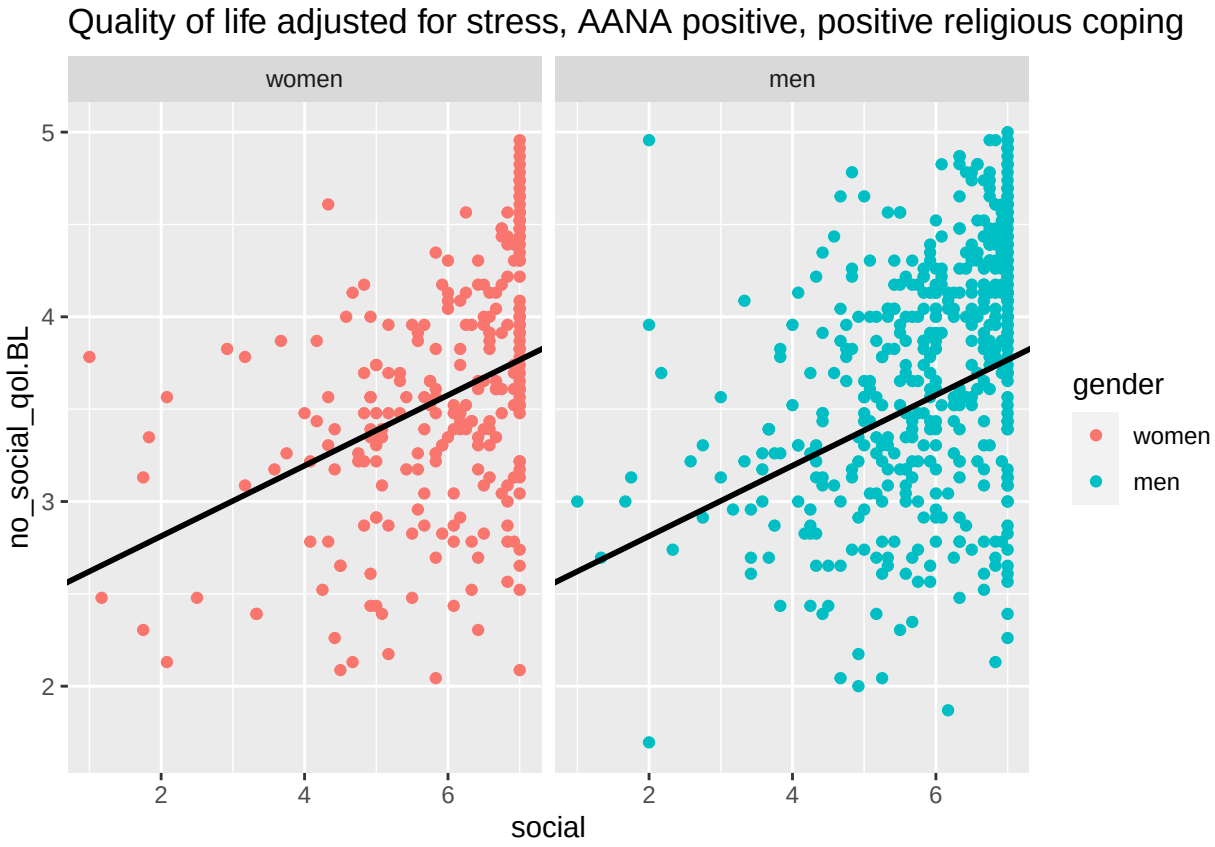
```
cleaned_addiction_data |>
  ggplot(aes(social, no_social_qol.BL, color=education)) +
  geom_point() +
  geom_abline(slope=coef_social, intercept = intercept +
                stress_to_subj_slope * stress_to_subj_mean +
                aana_positive_slope * aana_positive_mean +
                religion_pos_slope * religion_pos_mean, linewidth=1) +
  facet_wrap(vars(education)) +
  labs(title="Quality of life adjusted for stress, AANA positive, positive religious coping")
```




```
cleaned_addiction_data |>
  ggplot(aes(social, no_social_qol.BL, color=rel.is_religious)) +
  geom_point() +
  geom_abline(slope=coef_social, intercept = intercept +
                stress_to_subj_slope * stress_to_subj_mean +
                aana_positive_slope * aana_positive_mean +
                religion_pos_slope * religion_pos_mean, linewidth=1) +
  facet_wrap(vars(rel.is_religious)) +
  labs(title="Quality of life adjusted for stress, AANA positive, positive religious coping")
```




```
cleaned_addiction_data |>
  ggplot(aes(social, no_social_qol.BL, color=gender)) +
  geom_point() +
  geom_abline(slope=coef_social, intercept = intercept +
                stress_to_subj_slope * stress_to_subj_mean +
                aana_positive_slope * aana_positive_mean +
                religion_pos_slope * religion_pos_mean, linewidth=1) +
  facet_wrap(vars(gender)) +
  labs(title="Quality of life adjusted for stress, AANA positive, positive religious coping")
```


Quality of life adjusted for stress, AANA positive, positive religious coping
women
men
no_social_qol.BL
social
gender
women
men

Looking at Model Diagnostics

```
interaction_model <- lm(no_social_qol.BL ~ age
                + gender
                + education
                + SUD.sum_illegal
                + SUD.sum_legal
                + rel.is_religious * religion_pos
                + aana_past_year
                + aana_positive
                + social
                + stress_to_subj
                ,cleaned_addiction_data)

social_only_model <- lm(no_social_qol.BL ~ age
                + gender
                + education
                + SUD.sum_illegal
                + SUD.sum_legal
                + social
                ,cleaned_addiction_data)

with_religion_model <- lm(no_social_qol.BL ~ age
                + gender
                + education
                + SUD.sum_illegal
                + SUD.sum_legal
                + social
                + rel.is_religious * religion_pos
                ,cleaned_addiction_data)

with_aana_model <- lm(no_social_qol.BL ~ age
                + gender
                + education
                + SUD.sum_illegal
                + SUD.sum_legal
                + social
                + aana_past_year
                + aana_positive
                ,cleaned_addiction_data)

with_stress_model <- lm(no_social_qol.BL ~ age
                + gender
                + education
                + SUD.sum_illegal
                + SUD.sum_legal
                + social
                + stress_to_subj
                ,cleaned_addiction_data)
```

Akaike Information Criterion (AIC) Scores of models predicting quality of life with perceived level of social support

```
kable(AIC(qol_model,
          interaction_model,
          social_only_model,
          with_aana_model,
          with_religion_model,
          with_stress_model))
```

	df	AIC
qol_model	19	1247.6
interaction_model	20	1249.5
social_only_model	11	1288.8
with_aana_model	16	1283.6
with_religion_model	14	1279.2
with_stress_model	12	1272.2

- **Original model that takes into account perceived level of social support with degree of positive religious coping, AA/NA positive regard, and number of types of stressful life circumstances has lowest AIC score.**
  - `qol_model`
- Other models were:
  - based on original model and included interactions terms between if a patient is religious or not with degree of positive religious coping (`interaction_model`)
  - only considering perceived level of social support (`perceived level of social support`)
  - additionally either only considered:
    - degree of positive religious coping (`with_religion_model`)
    - AA/NA positive regard (`with_aana_model`)
    - number of types of stressful life circumstances (`with_stress_model`)**