

Effect of Pre-Meeting Small Talk on Perceived Social Cohesion

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Variables

```
str(data)
```

```
## tibble [169 x 12] (S3: tbl_df/tbl/data.frame)
## $ c_1      : num [1:169] 5 6 7 5 6 5 6 6 5 3 ...
## $ c_2      : num [1:169] 5 4 7 4 6 5 6 4 5 4 ...
## $ c_3      : num [1:169] 4 6 7 6 6 5 5 5 5 4 ...
## $ c_4      : num [1:169] 3 5 4 2 5 3 4 5 4 3 ...
## $ c_5      : num [1:169] 4 6 7 5 6 5 5 7 5 3 ...
## $ c_6      : num [1:169] 6 5 5 5 6 5 6 5 5 4 ...
## $ manip_ch : num [1:169] 6 1 5 4 3 3 5 3 3 4 ...
## $ gender   : num [1:169] 2 2 2 2 2 2 3 2 2 2 ...
## $ age      : num [1:169] 20 24 26 18 22 28 19 18 20 20 ...
## $ exp      : num [1:169] 1 1 1 1 1 1 1 1 1 1 ...
## $ exp_condition: Factor w/ 2 levels "0","1": 2 1 1 1 1 1 2 1 1 1 ...
## $ cohesion_mean: num [1:169] 4.5 5.33 6.17 4.5 5.83 ...
```

Descriptive Statistics

Global Descriptive statistics without group mean.

```
library(psych)
psych::describe(data)
```

```
##               vars   n  mean    sd median trimmed  mad min max range  skew
## c_1             1 169  5.22  1.21     5    5.31 1.48   1  7   6 -0.83
## c_2             2 169  4.85  1.19     5    4.88 1.48   2  7   5 -0.19
## c_3             3 169  5.24  1.21     5    5.32 1.48   1  7   6 -0.78
## c_4             4 169  3.89  1.16     4    3.89 1.48   1  7   6 -0.10
## c_5             5 169  5.05  1.32     5    5.16 1.48   0  7   7 -0.94
## c_6             6 169  4.68  1.25     5    4.75 1.48   1  7   6 -0.35
## manip_ch        7 169  3.78  1.75     4    3.77 1.48   1  7   6  0.08
## gender          8 169  1.89  0.53     2    1.91 0.00   1  5   4  1.33
## age            9 169 29.14 11.22    25   27.19 7.41  18 66  48  1.43
## exp           10 169  1.03  0.17     1    1.00 0.00   1  2   1  5.50
## exp_condition* 11 169  1.51  0.50     2    1.51 0.00   1  2   1 -0.04
## cohesion_mean  12 169  4.82  0.99     5    4.88 0.99   2  7   5 -0.57
##               kurtosis   se
## c_1                0.40 0.09
## c_2               -0.36 0.09
## c_3                0.30 0.09
## c_4                0.37 0.09
## c_5                0.81 0.10
## c_6               -0.31 0.10
## manip_ch         -1.11 0.13
## gender           8.88 0.04
## age              1.32 0.86
## exp            28.45 0.01
## exp_condition*  -2.01 0.04
## cohesion_mean    0.01 0.08
```

Means depending on the treatment (group: 1) vs control (group: 0)

```
psych::describeBy(data, data$exp_condition)
```

```
##
## Descriptive statistics by group
## group: 0
##               vars   n  mean    sd median trimmed  mad min max range  skew
## c_1             1  83  5.06  1.35   5.00    5.15 1.48   1  7   6 -0.79
## c_2             2  83  4.58  1.20   4.00    4.60 1.48   2  7   5 -0.04
## c_3             3  83  5.13  1.30   5.00    5.22 1.48   1  7   6 -0.84
## c_4             4  83  3.83  1.20   4.00    3.85 1.48   1  7   6 -0.06
## c_5             5  83  4.94  1.46   5.00    5.06 1.48   0  7   7 -0.94
## c_6             6  83  4.40  1.32   4.00    4.43 1.48   2  7   5 -0.06
## manip_ch        7  83  2.99  1.41   3.00    2.91 1.48   1  7   6  0.54
## gender          8  83  1.90  0.43   2.00    1.96 0.00   1  4   3  0.37
## age            9  83 29.57 12.08  25.00   27.34 7.41  18 66  48  1.50
## exp           10  83  1.04  0.19   1.00    1.00 0.00   1  2   1  4.88
## exp_condition* 11  83  1.00  0.00   1.00    1.00 0.00   1  1   0  NaN
## cohesion_mean  12  83  4.66  1.05   4.67    4.69 0.99   2  7   5 -0.31
##               kurtosis   se
## c_1                0.09 0.15
```

```
## c_2          -0.45 0.13
## c_3          0.34 0.14
## c_4          0.43 0.13
## c_5          0.64 0.16
## c_6         -0.69 0.15
## manip_ch     -0.29 0.15
## gender       6.82 0.05
## age          1.36 1.33
## exp          22.09 0.02
## exp_condition*   NaN 0.00
## cohesion_mean  -0.21 0.11
## -----
## group: 1
##          vars  n  mean    sd median trimmed  mad   min   max range  skew
## c_1         1 86  5.38  1.05   6.00   5.44 1.48   3.00   7.00    4 -0.62
## c_2         2 86  5.10  1.12   5.00   5.10 1.48   2.00   7.00    5 -0.30
## c_3         3 86  5.34  1.11   6.00   5.41 1.48   3.00   7.00    4 -0.58
## c_4         4 86  3.94  1.13   4.00   3.96 0.00   1.00   6.00    5 -0.13
## c_5         5 86  5.16  1.16   5.00   5.26 1.48   2.00   7.00    5 -0.72
## c_6         6 86  4.95  1.12   5.00   5.00 1.48   1.00   7.00    6 -0.56
## manip_ch     7 86  4.55  1.71   5.00   4.63 1.48   1.00   7.00    6 -0.54
## gender       8 86  1.87  0.61   2.00   1.86 0.00   1.00   5.00    4  1.61
## age          9 86 28.72 10.39  24.50  27.17 6.67  18.00  59.00   41  1.24
## exp         10 86  1.02  0.15   1.00   1.00 0.00   1.00   2.00    1  6.22
## exp_condition* 11 86  2.00  0.00   2.00   2.00 0.00   2.00   2.00    0  NaN
## cohesion_mean 12 86  4.98  0.91   5.17   5.06 0.74   2.33   6.33    4 -0.82
##          kurtosis   se
## c_1         -0.19 0.11
## c_2         -0.17 0.12
## c_3         -0.34 0.12
## c_4          0.21 0.12
## c_5         -0.01 0.12
## c_6          0.48 0.12
## manip_ch    -0.75 0.18
## gender       7.93 0.07
## age          0.69 1.12
## exp         37.08 0.02
## exp_condition*   NaN 0.00
## cohesion_mean   0.40 0.10
```

Mean difference between group: $5.03 - 4.62 = 0.41$

Requirement: Manipulation Check

```
t.test(manip_ch ~ exp_condition, data=data) # Ho:  $\mu = 39000$ 
```

```
##
## Welch Two Sample t-test
##
## data: manip_ch by exp_condition
## t = -6.4839, df = 163.17, p-value = 1.016e-09
```

```
## alternative hypothesis: true difference in means between group 0 and group 1 is not equal to 0
## 95 percent confidence interval:
## -2.033206 -1.083914
## sample estimates:
## mean in group 0 mean in group 1
##      2.987952      4.546512
```

Manipulation check is significantly higher in the experimental group, $t(163) = -6.48$, $p < .001$

Analysis of a variance

Without Control Variables

```
one.way <- aov(cohesion_mean ~ exp_condition, data = data)
summary(one.way)
```

```
##              Df Sum Sq Mean Sq F value Pr(>F)
## exp_condition  1   4.43   4.434   4.617 0.0331 *
## Residuals    167 160.38   0.960
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

So far the $F(1,163) = 4.19$, $p = .04$ is significant.

With Age and Gender Controlled

```
one.way <- aov(cohesion_mean ~ exp_condition + age + gender, data = data)
summary(one.way)
```

```
##              Df Sum Sq Mean Sq F value Pr(>F)
## exp_condition  1   4.43   4.434   4.613 0.0332 *
## age           1   1.00   1.000   1.040 0.3092
## gender        1   0.80   0.798   0.830 0.3635
## Residuals    165 158.58   0.961
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

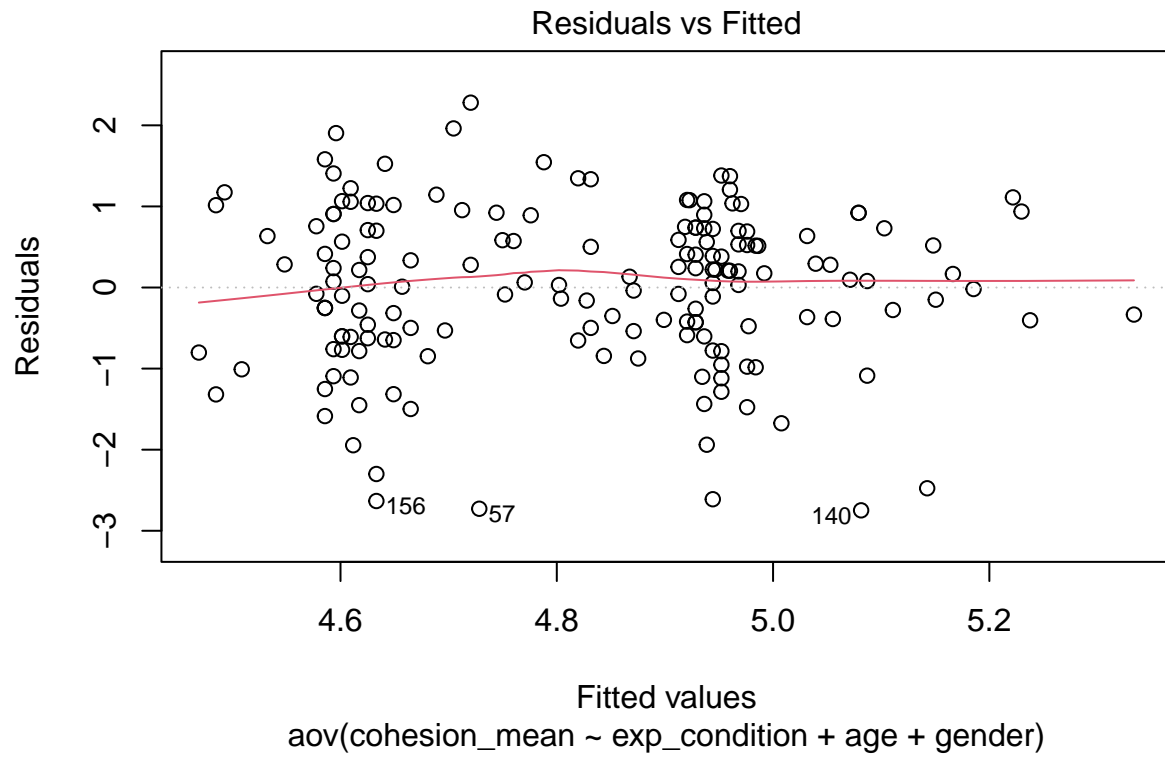
Neither gender nor age has a significant impact on team cohesion.

So far the $F(1,165) = 4.61$, $p = .003$ is significant.

ANOVA Model Diagnostic

1. linearity assumption of predictors

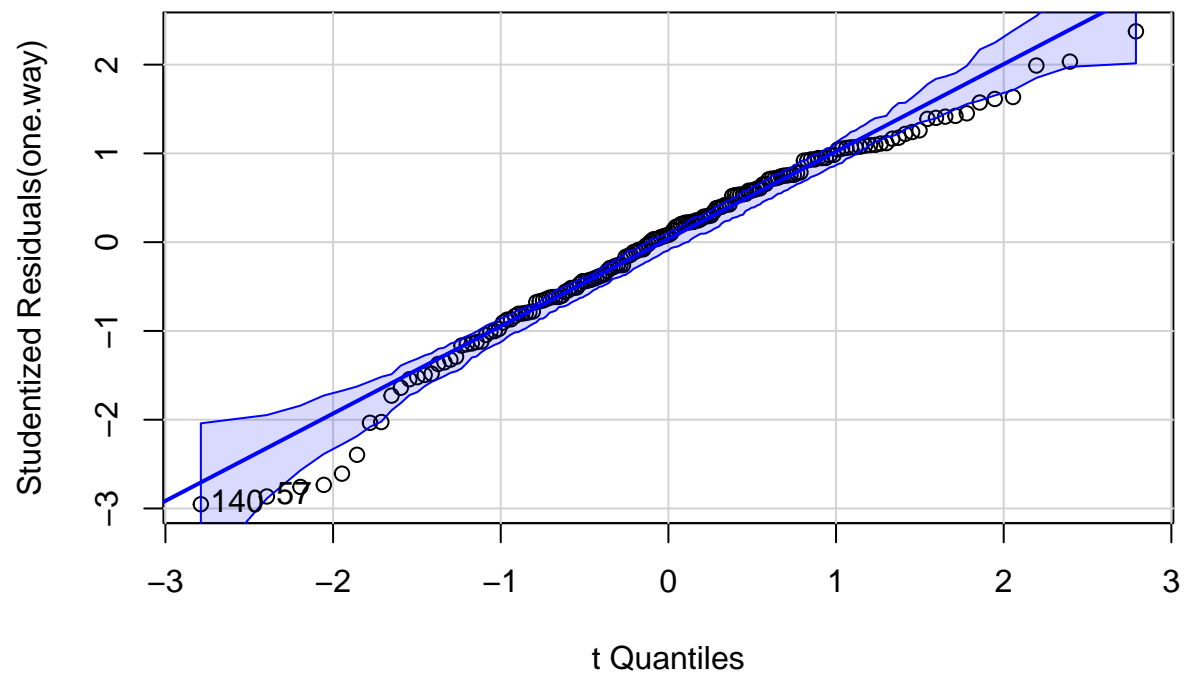
```
plot(one.way, 1)
```



Flat line. Looks good.

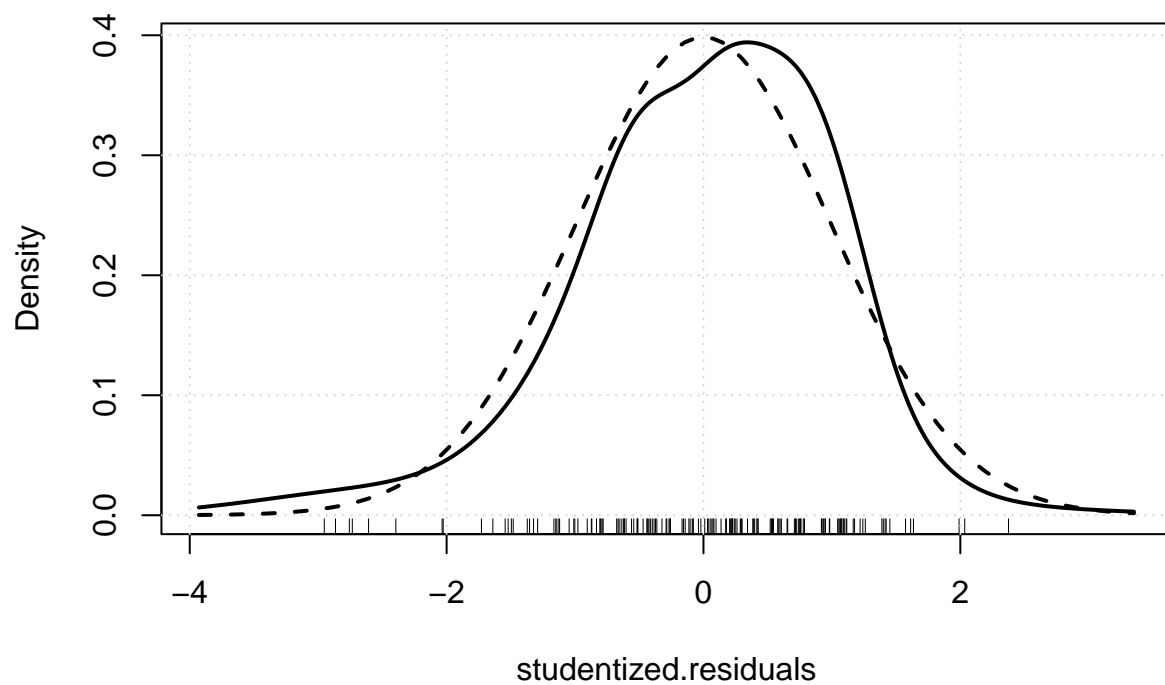
2. Normalverteilung der Residuen

```
car::qqPlot(one.way)
```



```
## [1] 57 140
```

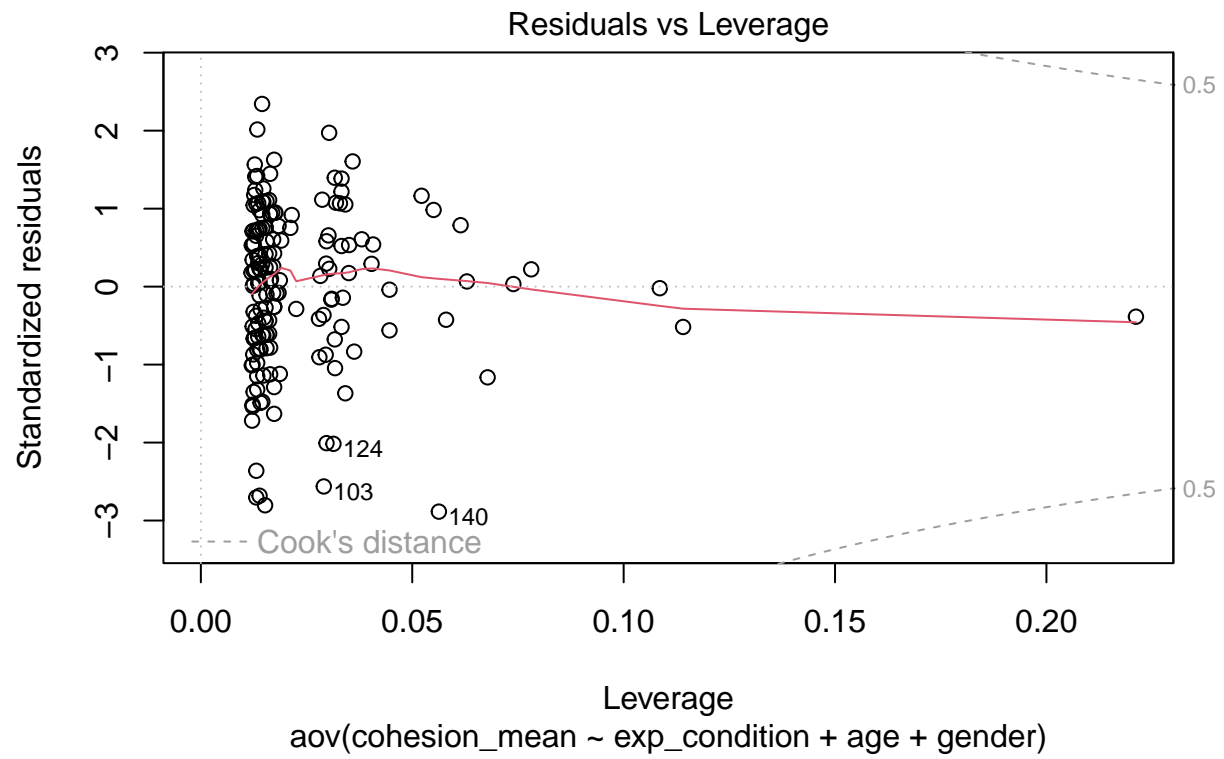
```
studentized.residuals <- rstudent(one.way)
car::densityPlot(studentized.residuals) # Dichtekurve der Residuen
df <- one.way$df.residual
curve(dt(x, df= df), # theor. Kurve zum Vergleich
      add= TRUE, lwd= 2, lty= 2
) # graph. Parameter
```



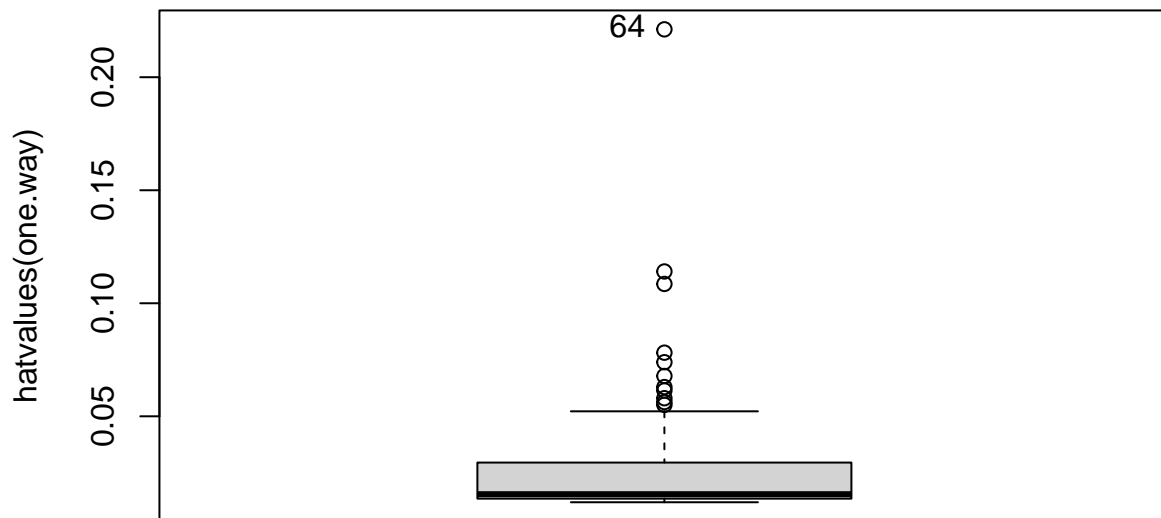
There are observations out of the CI e.g. 57.

3. Outliers & leverage points

```
plot(one.way, 5)
```



```
car::Boxplot(hatvalues(one.way), id= list(n=1)) # Hebelwerte
```

```
## [1] 64
```

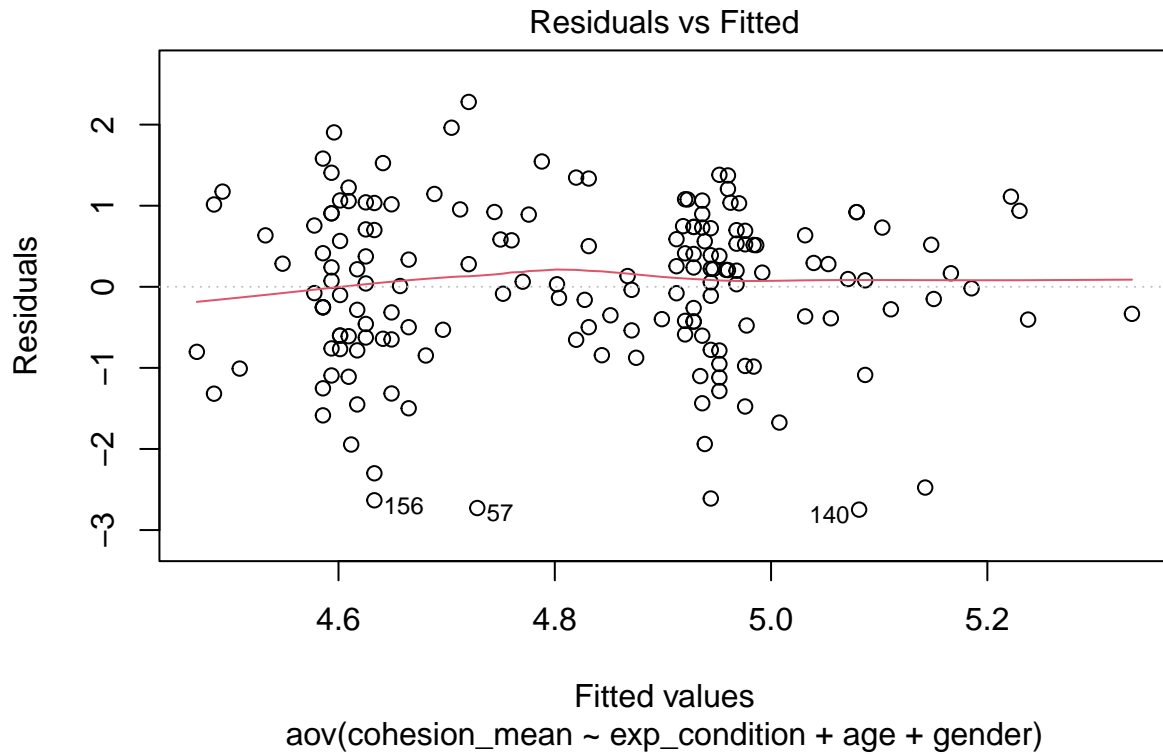
```
car::outlierTest(one.way)
```

```
## No Studentized residuals with Bonferroni p < 0.05
## Largest |rstudent|:
##      rstudent unadjusted p-value Bonferroni p
## 140 -2.952285      0.0036174      0.61134
```

Individual 140 seems to be an outlier. Still not over Cooks Distance. Would leave the subject within the sample.

4. Homoscedacity

```
## Residuals vs Fitted Plot to observe homoscedacity
plot(one.way, which = 1)
```



Variance looks “rather” constant across level of predictor.

5. multicollinearity

```
# "discovering statistics using R" p. 293
# If the largest VIF is greater than 10 then there is cause for concern (Bowerman & O'Connell, 1990; My
car::vif(one.way)
```

```
## exp_condition      age      gender
##      1.002785      1.030674      1.030126
```

Predictors are not correlated. All variance inflation factors are close to 1.