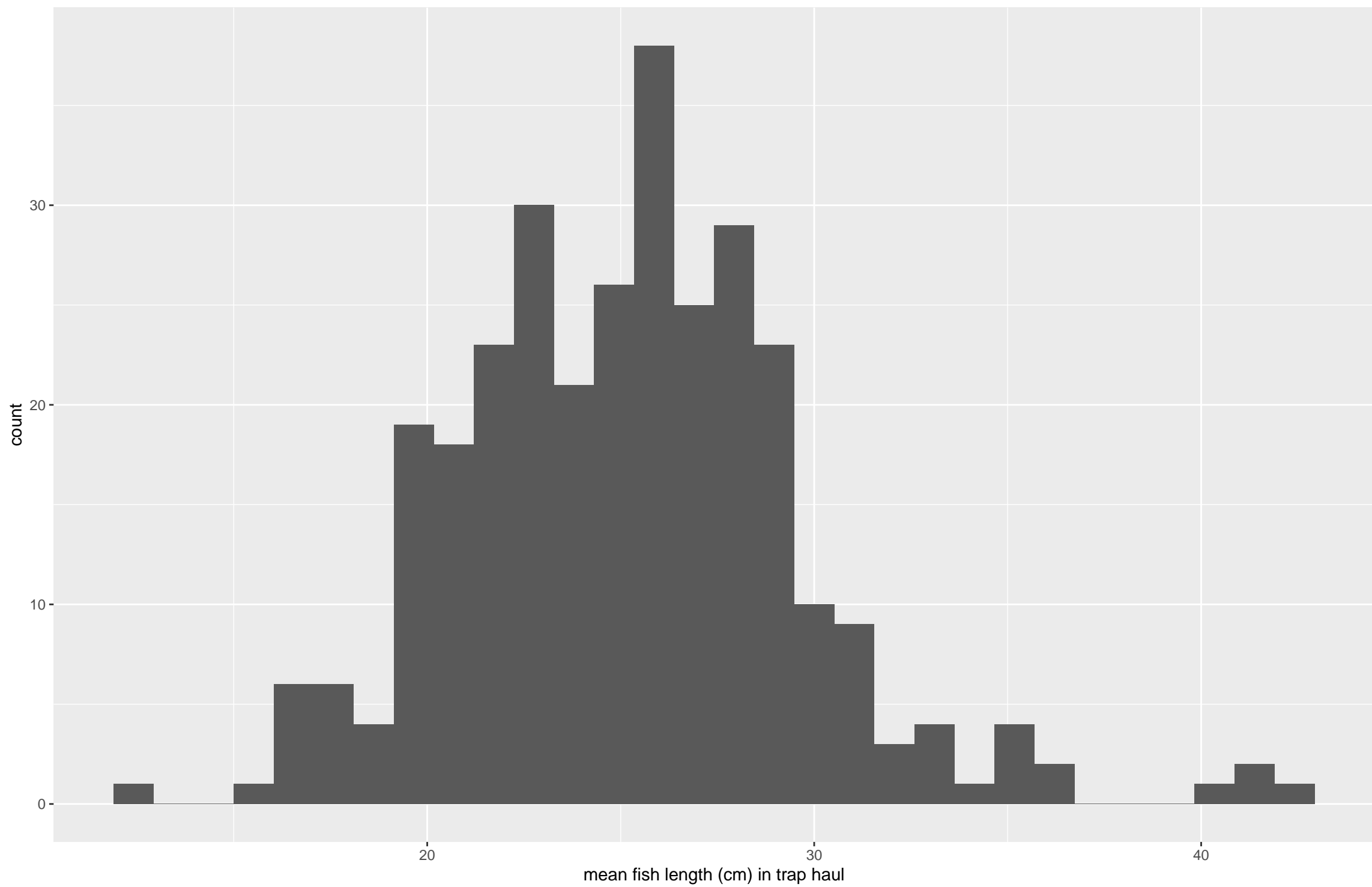
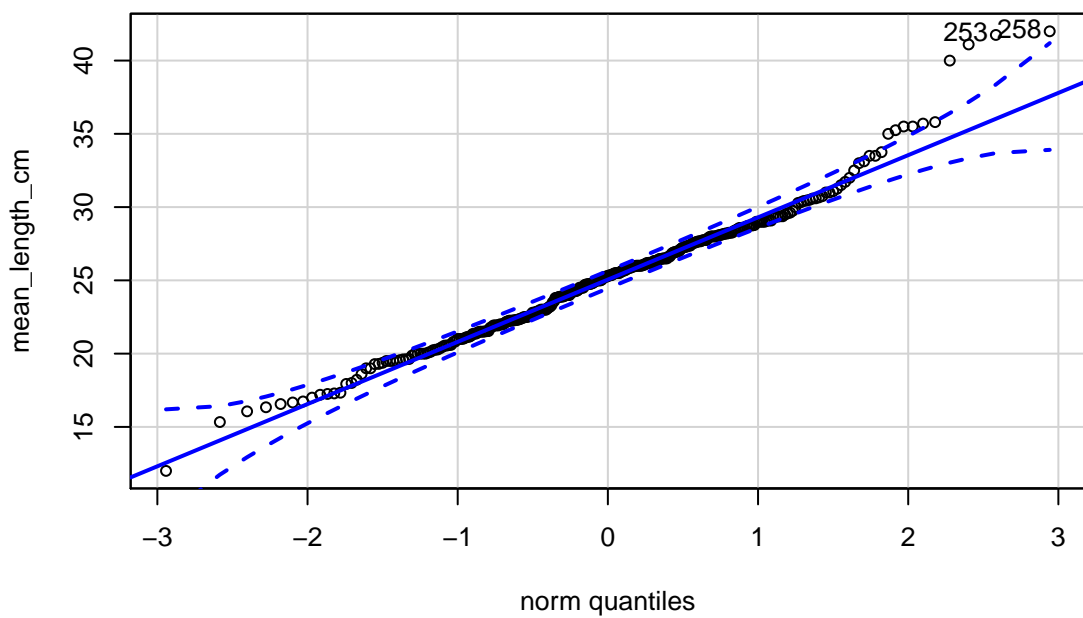


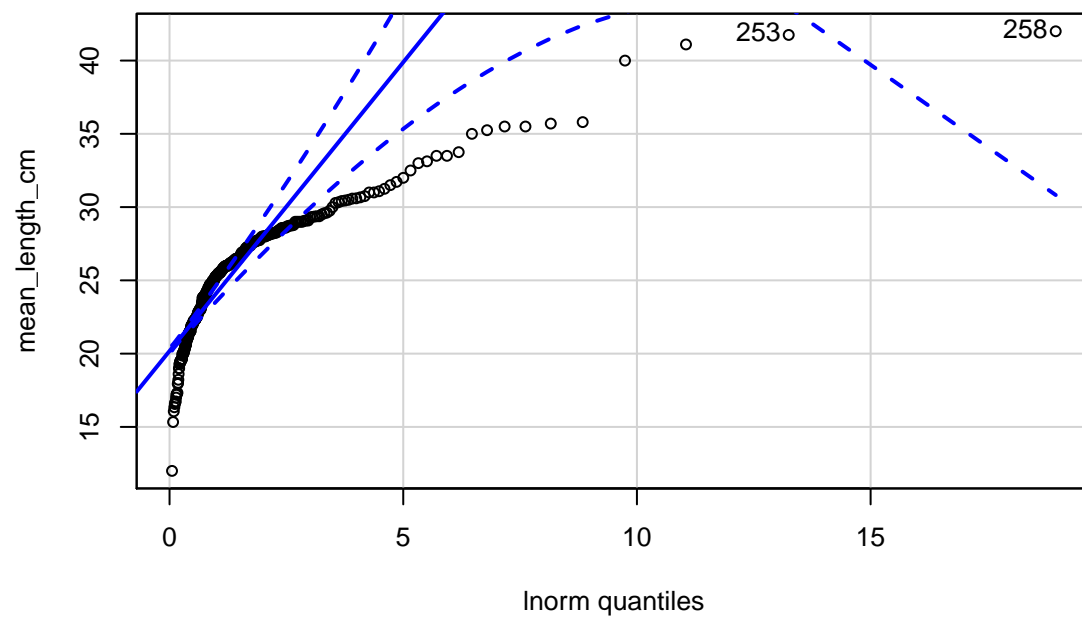
Histogram of mean fish length (cm)



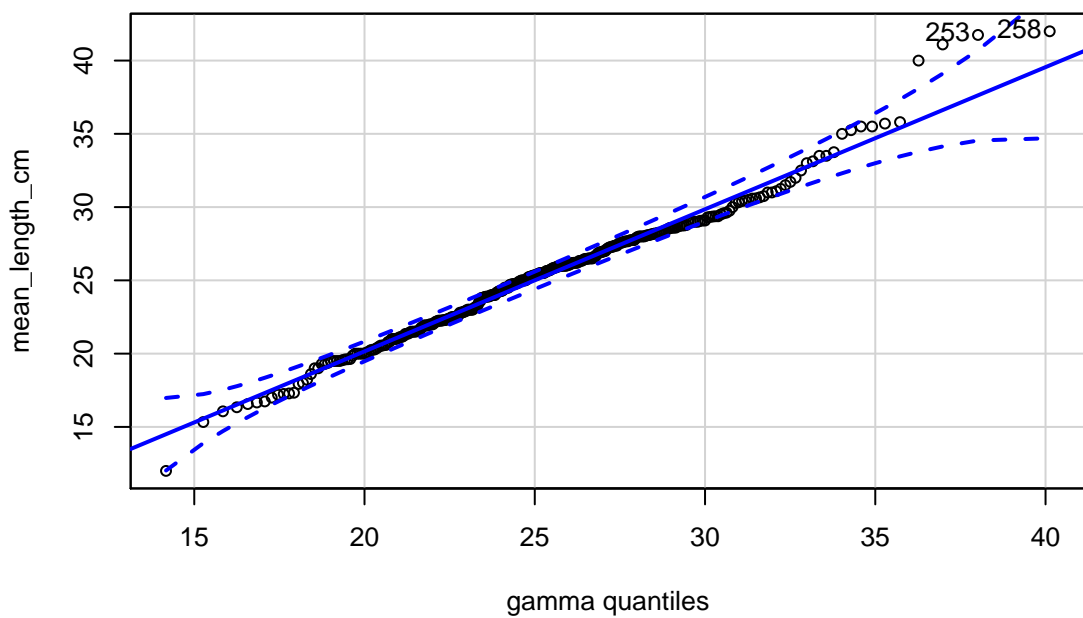
Normal distribution



Log-normal distribution



Gamma distribution



```
Global model call: lmer(formula = mean_length_cm ~ design + log_days_since_last_haul +
  location_exposure + Exp_or_Cont + Exp_or_Cont * log_days_since_last_haul +
  (1 | TrapID) + (1 | Date_YMD), data = trap_haul_no_zero,
  REML = FALSE, na.action = "na.fail")
```

Model selection table

	(Int)	dsg	Exp_or_Cont	lct_exp	log_dys_snc_lst_hal	Exp_or_Cont:log_dys_snc_lst_hal	df	logLik	AICc	delta	weight
14	17.32	+		+	2.799		7	-864.667	1743.7	0.00	0.257
13	19.17			+	2.567		6	-866.186	1744.7	0.94	0.161
9	19.31				2.581		5	-867.461	1745.1	1.41	0.127
16	17.34	+		+	2.799		8	-864.665	1745.8	2.10	0.090
32	16.03	+		+	3.368		+ 9	-863.654	1745.9	2.20	0.086
15	19.18			+	2.568		7	-866.186	1746.7	3.04	0.056
31	17.88			+	3.135		+ 8	-865.191	1746.9	3.16	0.053
10	19.00	+			2.624		6	-867.385	1747.0	3.34	0.048
11	19.33			+	2.580		6	-867.460	1747.2	3.49	0.045
27	18.03			+	3.149		+ 7	-866.464	1747.3	3.59	0.043
12	19.02	+		+	2.624		7	-867.382	1749.1	5.43	0.017
28	17.71	+		+	3.193		+ 8	-866.383	1749.2	5.54	0.016
1	25.08						4	-875.401	1758.9	15.23	0.000
5	24.95			+			5	-874.736	1759.7	15.96	0.000
6	24.09	+		+			6	-874.153	1760.6	16.88	0.000
2	24.95	+					5	-875.379	1761.0	17.25	0.000
3	25.10			+			5	-875.399	1761.0	17.29	0.000
7	24.97			+	+		6	-874.734	1761.7	18.04	0.000
8	24.11	+		+	+		7	-874.151	1762.7	18.97	0.000
4	24.97	+		+			6	-875.376	1763.0	19.32	0.000

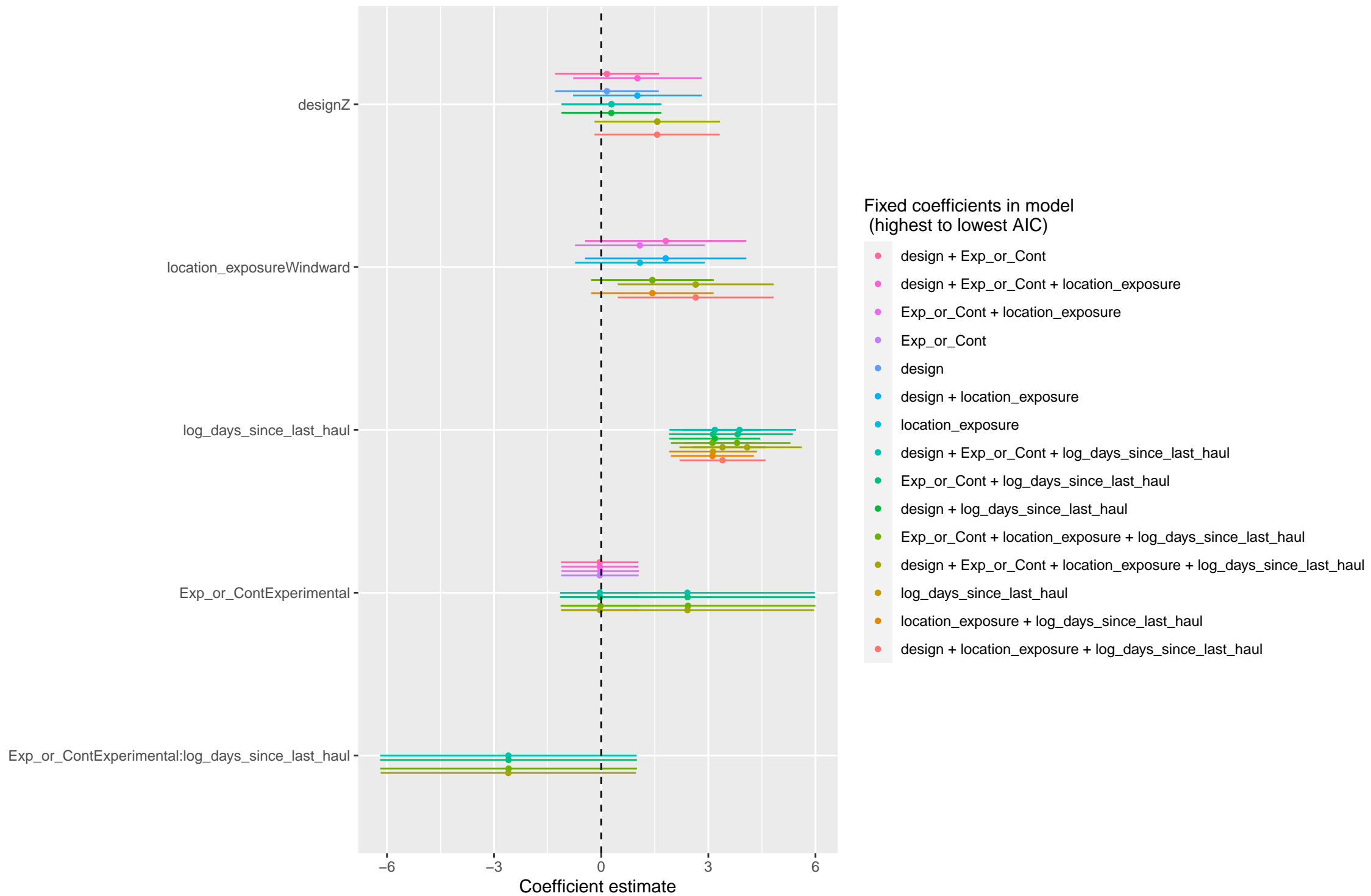
Models ranked by AICc(x)

Random terms (all models):

...1 | TrapID..., ...1 | Date_YMD...

model	sigma	logLik	AIC	BIC	deviance	df.residual
design + location_exposure + log_days_since_last_haul	3.90	-864.67	1743.33	1769.42	1729.33	300
location_exposure + log_days_since_last_haul	3.91	-866.19	1744.37	1766.73	1732.37	301
log_days_since_last_haul	3.91	-867.46	1744.92	1763.56	1734.92	302
design + Exp_or_Cont + location_exposure + log_days_since_last_haul	3.90	-864.67	1745.33	1775.15	1729.33	299
design + Exp_or_Cont + location_exposure + log_days_since_last_haul	3.88	-863.65	1745.31	1778.85	1727.31	298
Exp_or_Cont + location_exposure + log_days_since_last_haul	3.91	-866.19	1746.37	1772.46	1732.37	300
Exp_or_Cont + location_exposure + log_days_since_last_haul	3.90	-865.19	1746.38	1776.20	1730.38	299
design + log_days_since_last_haul	3.91	-867.38	1746.77	1769.13	1734.77	301
Exp_or_Cont + log_days_since_last_haul	3.91	-867.46	1746.92	1769.28	1734.92	301
Exp_or_Cont + log_days_since_last_haul	3.90	-866.46	1746.93	1773.02	1732.93	300
design + Exp_or_Cont + log_days_since_last_haul	3.91	-867.38	1748.76	1774.85	1734.76	300
design + Exp_or_Cont + log_days_since_last_haul	3.90	-866.38	1748.77	1778.58	1732.77	299
none	3.91	-875.40	1758.80	1773.71	1750.80	303
location_exposure	3.91	-874.74	1759.47	1778.11	1749.47	302
design + location_exposure	3.89	-874.15	1760.31	1782.67	1748.31	301
design	3.90	-875.38	1760.76	1779.39	1750.76	302
Exp_or_Cont	3.91	-875.40	1760.80	1779.43	1750.80	302
Exp_or_Cont + location_exposure	3.91	-874.73	1761.47	1783.83	1749.47	301
design + Exp_or_Cont + location_exposure	3.89	-874.15	1762.30	1788.39	1748.30	300
design + Exp_or_Cont	3.90	-875.38	1762.75	1785.11	1750.75	301

Predicting mean fish length (cm) in trap haul



Backward reduced random-effect table:

	Eliminated	npar	logLik	AIC	LRT	Df	Pr(>Chisq)
<none>		9	-863.65	1745.3			
(1 TrapID)	0	8	-864.95	1745.9	2.5834	1	0.10799
(1 Date_YMD)	0	8	-865.25	1746.5	3.1972	1	0.07376 .

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Backward reduced fixed-effect table:
Degrees of freedom method: Satterthwaite

	Eliminated	Sum Sq	Mean Sq	NumDF	DenDF	F value	Pr(>F)
log_days_since_last_haul:Exp_or_Cont	1	30.67	30.67	1	289.607	2.0331	0.15498
Exp_or_Cont	2	0.06	0.06	1	29.248	0.0042	0.94895
design	3	46.57	46.57	1	104.972	3.0641	0.08296 .
location_exposure	4	41.14	41.14	1	106.646	2.6850	0.10425
log_days_since_last_haul	0	382.10	382.10	1	20.651	24.9495	6.356e-05 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Model found:
mean_length_cm ~ log_days_since_last_haul + (1 | TrapID) + (1 |
Date_YMD)

Optimal model found using 'step' function which performs backward elimination of fixed-effect terms

```
Linear mixed model fit by maximum likelihood . t-tests use Satterthwaite's method ['lmerModLmerTest']
Formula: mean_length_cm ~ log_days_since_last_haul + (1 | TrapID) + (1 | Date_YMD)
Data: trap_haul_no_zero
```

AIC	BIC	logLik	deviance	df.resid
1744.9	1763.6	-867.5	1734.9	302

Scaled residuals:

Min	1Q	Median	3Q	Max
-2.4728	-0.6452	-0.0381	0.5038	4.0926

Random effects:

Groups	Name	Variance	Std.Dev.
TrapID	(Intercept)	0.7159	0.8461
Date_YMD	(Intercept)	1.0804	1.0394
Residual		15.3150	3.9134

Number of obs: 307, groups: TrapID, 37; Date_YMD, 23

Fixed effects:

	Estimate	Std. Error	df	t value	Pr(> t)
(Intercept)	19.3115	1.2187	22.3752	15.846	1.19e-13 ***
log_days_since_last_haul	2.5805	0.5166	20.6510	4.995	6.36e-05 ***

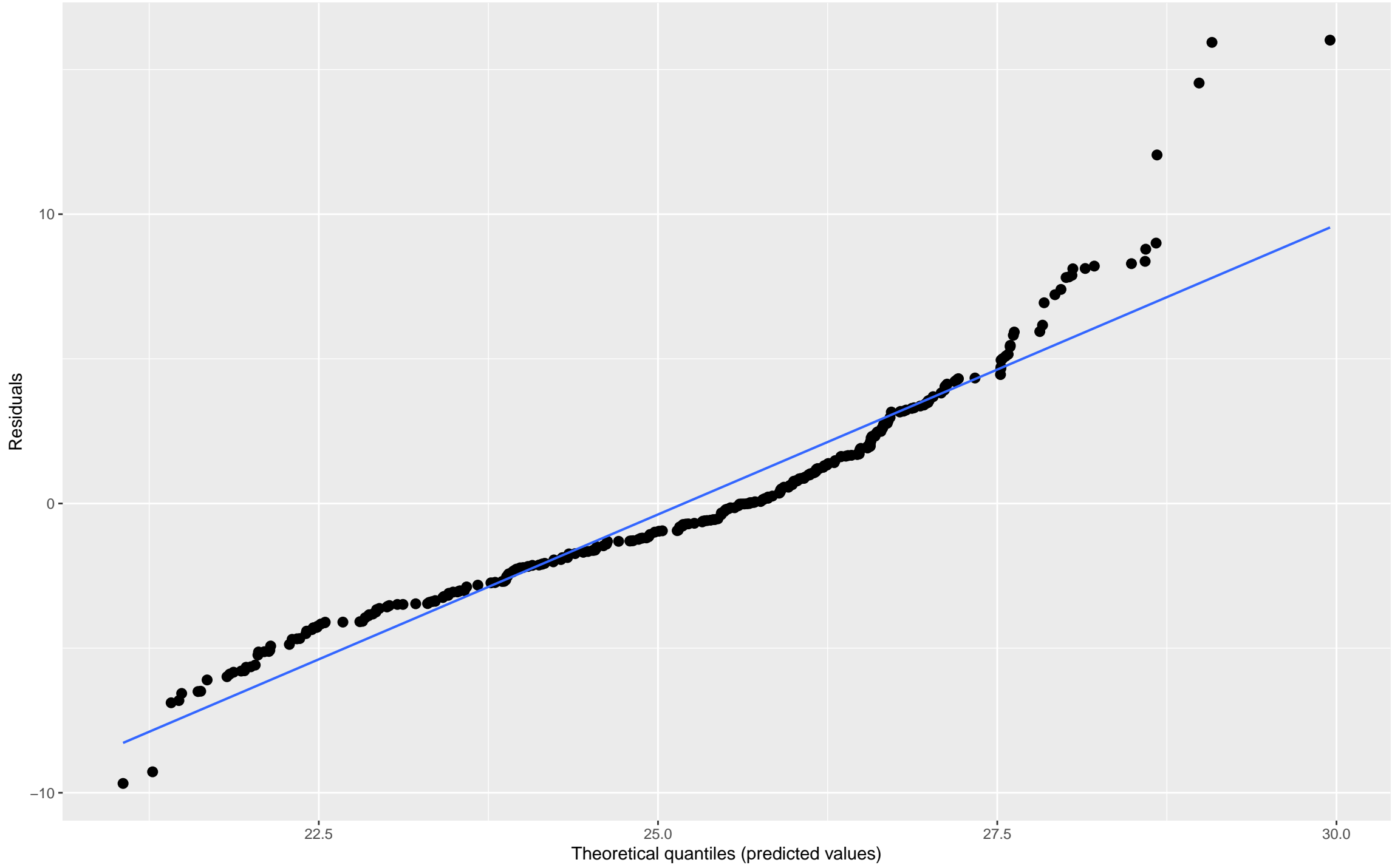
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Correlation of Fixed Effects:

	(Intr)
lg_dys_sn__	-0.956

Non-normality of residuals and outliers

Dots should be plotted along the line



(Intercept)

Random effect quantiles

3
2
1
0
-1
-2

-2

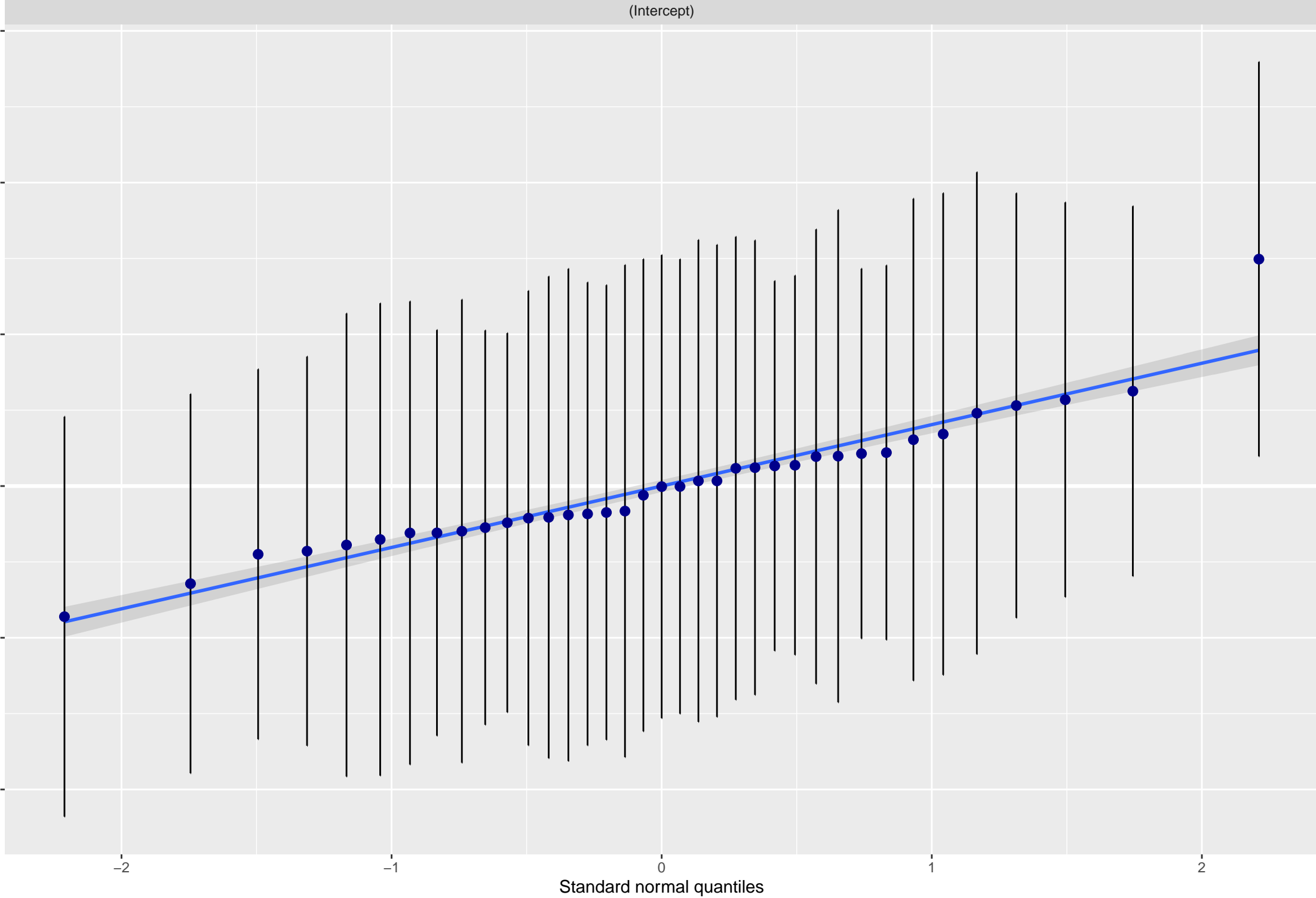
-1

0

1

2

Standard normal quantiles



(Intercept)

Random effect quantiles

2

0

-2

-2

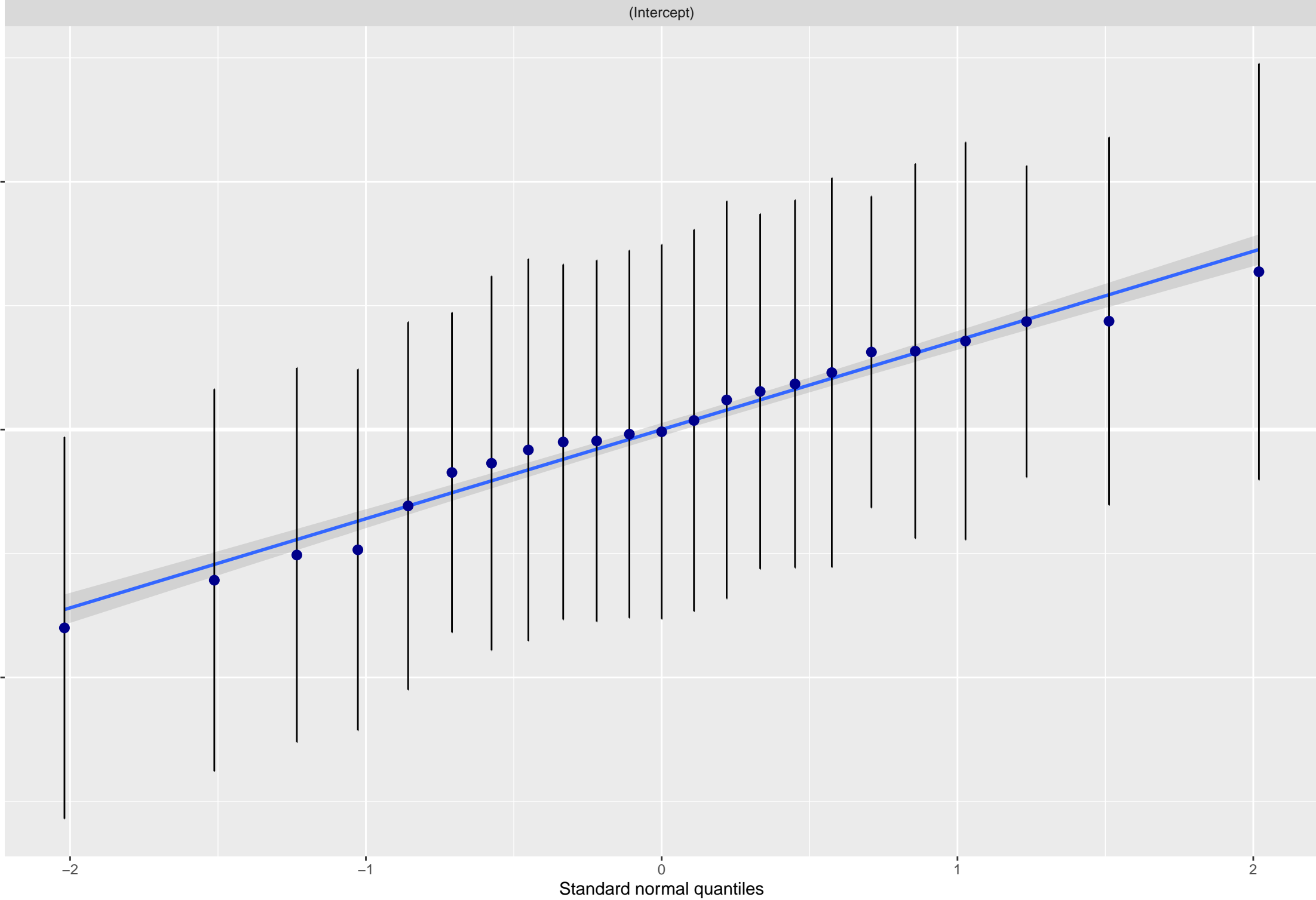
-1

0

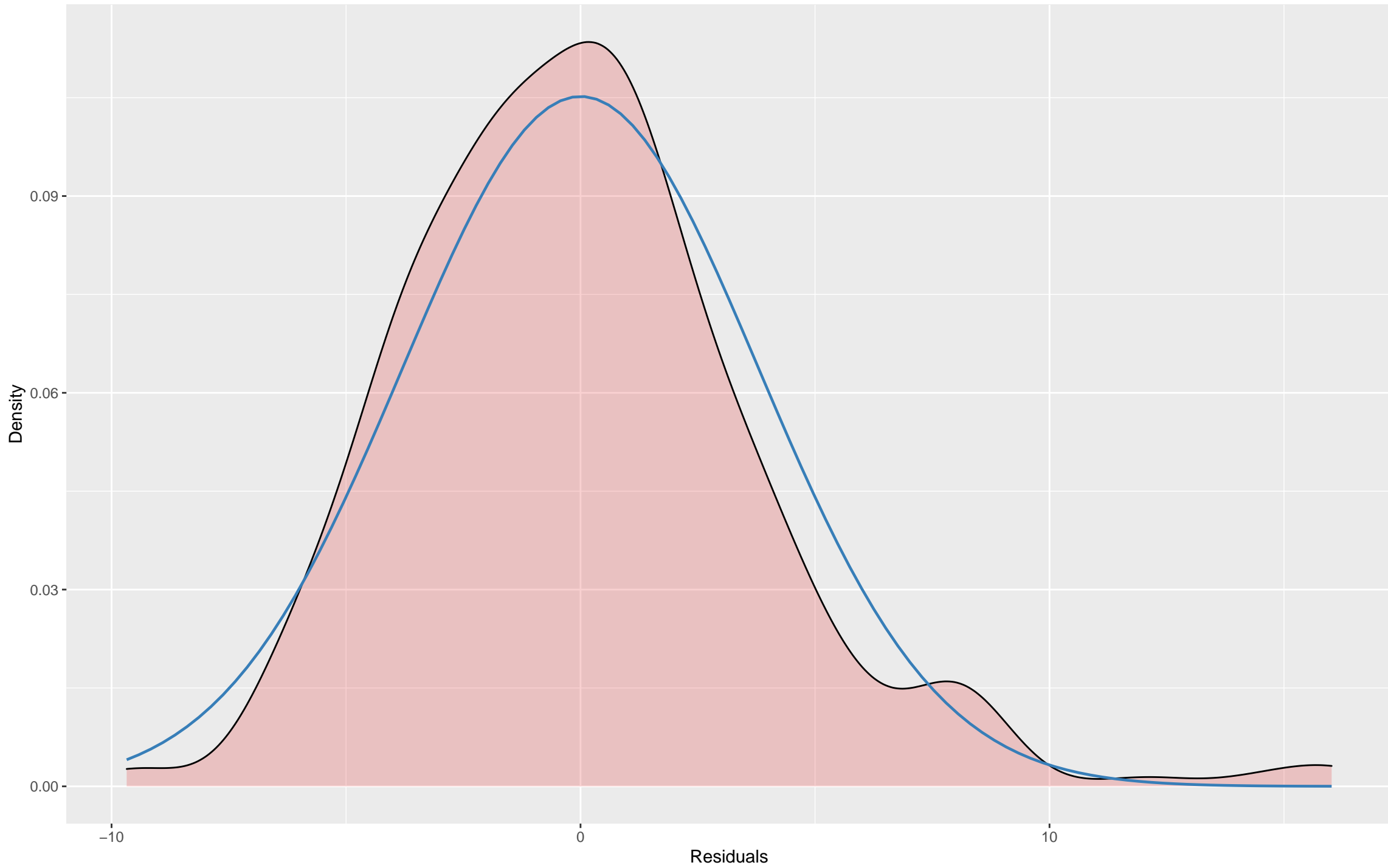
1

2

Standard normal quantiles

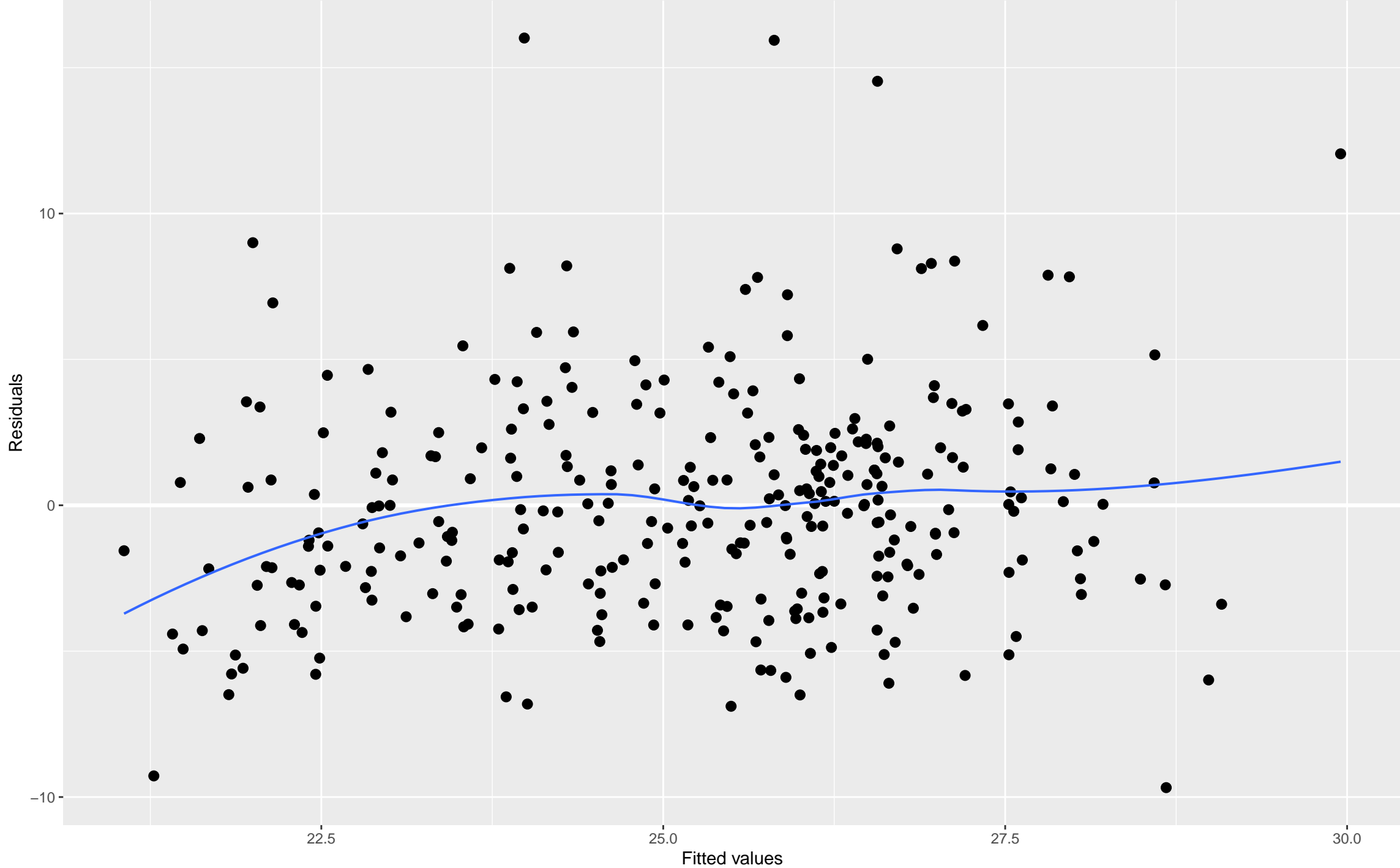


Non-normality of residuals
Distribution should look like normal curve



Homoscedasticity (constant variance of residuals)

Amount and distance of points scattered above/below line is equal or randomly spread



Model summaries for all models with delta AIC < 2

```
$'design + location_exposure + log_days_since_last_haul'
Linear mixed model fit by maximum likelihood . t-tests use Satterthwaite's method ['lmerModLmerTest']
Formula: mean_length_cm ~ design + location_exposure + log_days_since_last_haul + (1 | TrapID) + (1 | Date_YMD)
Data: trap_haul_no_zero

           AIC      BIC    logLik deviance df.resid
1743.3    1769.4    -864.7   1729.3      300

Scaled residuals:
    Min      1Q  Median      3Q      Max
-2.5119 -0.6380 -0.0195  0.4568  4.1615

Random effects:
Groups   Name              Variance Std.Dev.
TrapID   (Intercept)    0.6457  0.8036
Date_YMD (Intercept)    0.8422  0.9177
Residual                    15.1988  3.8986
Number of obs: 307, groups: TrapID, 37; Date_YMD, 23

Fixed effects:
              Estimate Std. Error      df t value Pr(>|t|)
(Intercept)    17.3201    1.5711  57.5083  11.024 8.29e-16 ***
designZ         1.5656    0.8944 104.9719   1.750  0.0830 .
location_exposureWindward 2.6452    1.1135 143.6187   2.376  0.0188 *
log_days_since_last_haul  2.7994    0.5067  24.1538   5.525 1.08e-05 ***
---
Signif. codes:  0 '***'... 0.001 '**'... 0.01 '*'... 0.05 '.'... 0.1 '...' 1

Correlation of Fixed Effects:
          (Intr) desgnZ lctn_M
designZ    -0.678
lctn_xparWn -0.459  0.627
lg_dys_sn_ -0.855  0.268  0.142

$'location_exposure + log_days_since_last_haul'
Linear mixed model fit by maximum likelihood . t-tests use Satterthwaite's method ['lmerModLmerTest']
Formula: mean_length_cm ~ location_exposure + log_days_since_last_haul + (1 | TrapID) + (1 | Date_YMD)
Data: trap_haul_no_zero

           AIC      BIC    logLik deviance df.resid
1744.4    1766.7    -866.2   1732.4      301

Scaled residuals:
    Min      1Q  Median      3Q      Max
-2.4453 -0.6286 -0.0413  0.4457  4.1318

Random effects:
Groups   Name              Variance Std.Dev.
TrapID   (Intercept)    0.7102  0.8427
Date_YMD (Intercept)    0.8339  0.9132
Residual                    15.3208  3.9142
Number of obs: 307, groups: TrapID, 37; Date_YMD, 23

Fixed effects:
              Estimate Std. Error      df t value Pr(>|t|)
(Intercept)    19.1684    1.1573  22.6016  16.562 3.94e-14 ***
location_exposureWindward 1.4344    0.8754 106.8460   1.639  0.104
log_days_since_last_haul  2.5674    0.4888  20.9287   5.253 3.34e-05 ***
---
Signif. codes:  0 '***'... 0.001 '**'... 0.01 '*'... 0.05 '.'... 0.1 '...' 1

Correlation of Fixed Effects:
          (Intr) lctn_M
lctn_xparWn -0.060
lg_dys_sn_  -0.951 -0.034

$log_days_since_last_haul
Linear mixed model fit by maximum likelihood . t-tests use Satterthwaite's method ['lmerModLmerTest']
Formula: mean_length_cm ~ log_days_since_last_haul + (1 | TrapID) + (1 | Date_YMD)
Data: trap_haul_no_zero

           AIC      BIC    logLik deviance df.resid
1744.9    1763.6    -867.5   1734.9      302

Scaled residuals:
    Min      1Q  Median      3Q      Max
-2.4728 -0.6452 -0.0381  0.5038  4.0926

Random effects:
Groups   Name              Variance Std.Dev.
TrapID   (Intercept)    0.7159  0.8461
Date_YMD (Intercept)    1.0804  1.0394
Residual                    15.3150  3.9134
Number of obs: 307, groups: TrapID, 37; Date_YMD, 23

Fixed effects:
              Estimate Std. Error      df t value Pr(>|t|)
(Intercept)    19.3115    1.2187  22.3752  15.846 1.19e-13 ***
log_days_since_last_haul  2.5805    0.5166  20.6510   4.995 6.36e-05 ***
---
Signif. codes:  0 '***'... 0.001 '**'... 0.01 '*'... 0.05 '.'... 0.1 '...' 1

Correlation of Fixed Effects:
          (Intr)
lg_dys_sn_ -0.956
```

Full model summary

```
Linear mixed model fit by maximum likelihood . t-tests use Satterthwaite's method ['lmerModLmerTest']
Formula: mean_length_cm ~ design + log_days_since_last_haul + location_exposure +      Exp_or_Cont * Exp_or_Cont * log_days_since_last_haul + (1 |
      TrapID) * (1 | Date_YMD)
Data: trap_haul_no_zero

      AIC      BIC    logLik deviance df.resid
1745.3   1778.8   -863.7   1727.3      298

Scaled residuals:
      Min       1Q   Median       3Q      Max
-2.5208 -0.6465  0.0036  0.4761  4.0844

Random effects:
Groups   Name              Variance Std.Dev.
TrapID   (Intercept)    0.6708  0.8190
Date_YMD (Intercept)    0.8286  0.9103
Residual                    15.0837  3.8838
Number of obs: 307, groups:  TrapID, 37; Date_YMD, 23

Fixed effects:
              Estimate Std. Error    df t value Pr(>|t|) ***
(Intercept)    16.0299      1.8332  94.0057  8.744 8.58e-14 ***
designZ         1.5748      0.8940 102.5299  1.761  0.0812 .
log_days_since_last_haul    3.3681      0.6421  59.3467  5.246 2.18e-06 ***
location_exposureWindward    2.6460      1.1122 140.7855  2.379  0.0187 *
Exp_or_ContExperimental    2.4172      1.8069 244.3423  1.338  0.1822
log_days_since_last_haul:Exp_or_ContExperimental -1.0716      0.7516 289.6069 -1.426  0.1550
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Correlation of Fixed Effects:
              (Intr) designZ lg_____ lctn_W Ex__CE
designZ         -0.579
lg_dys_sm_____ -0.881  0.213
lctn_xparWn_____ -0.391  0.627  0.109
Exp_r_CntEx_____ -0.521  0.000  0.589 -0.002
l_____E__CE      0.498 -0.005 -0.620  0.003 -0.952
```