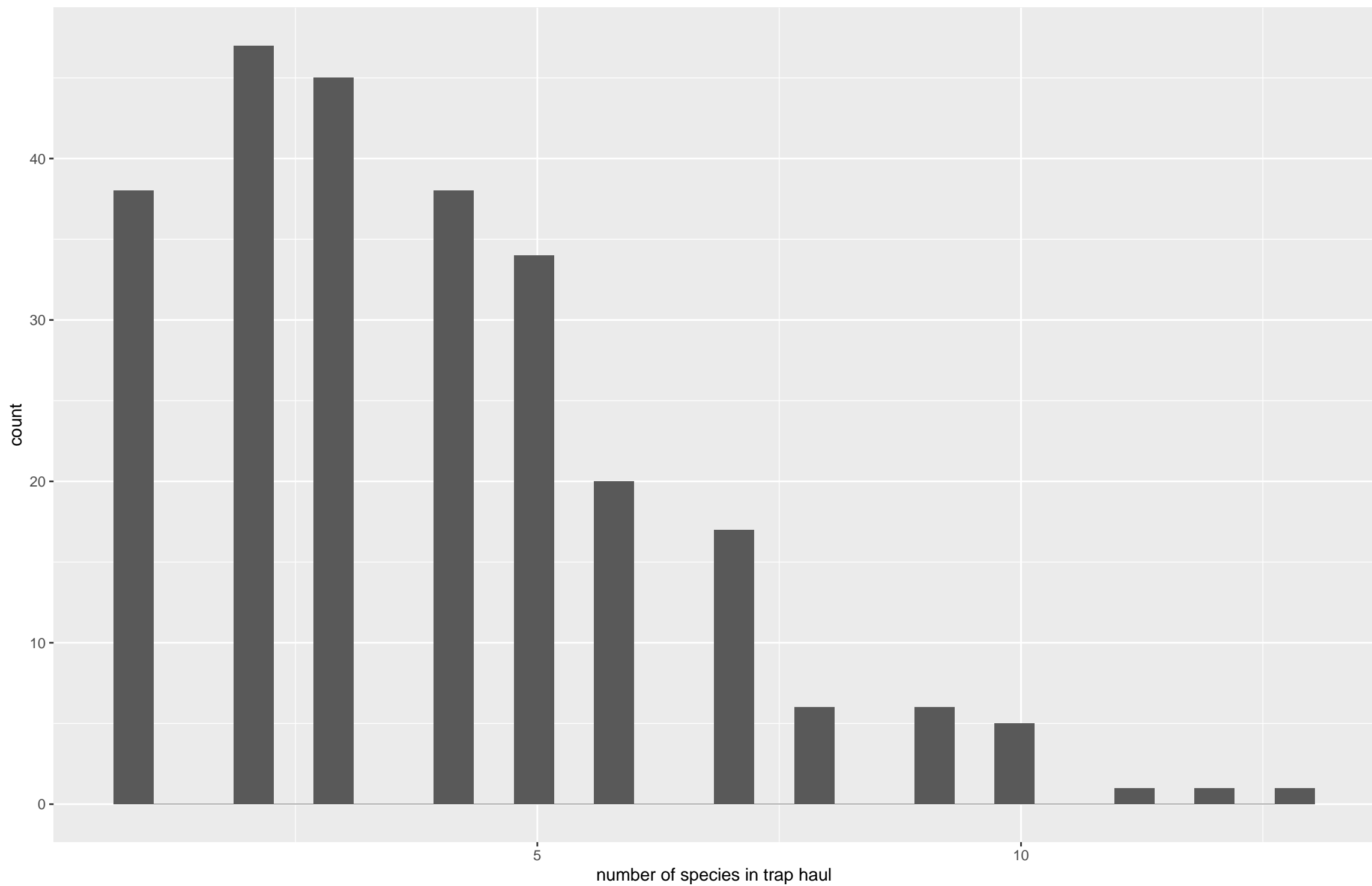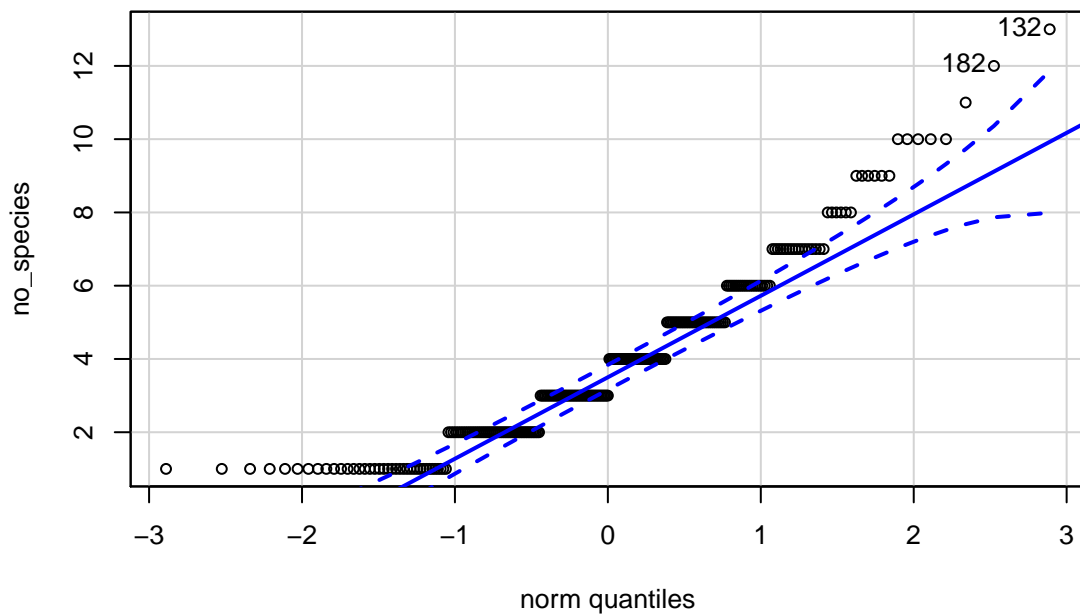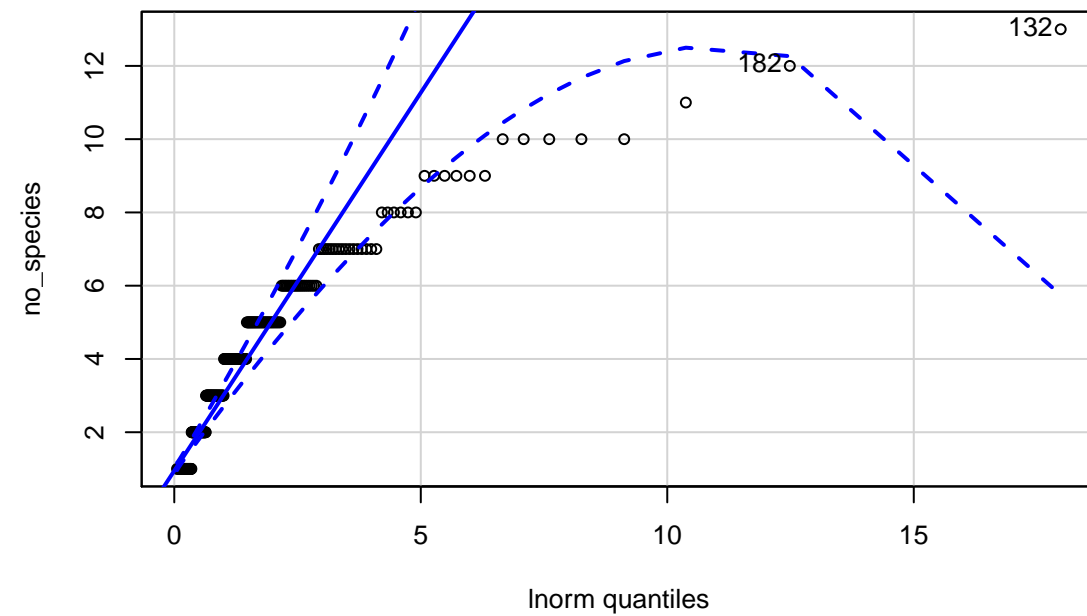Histogram of number of species
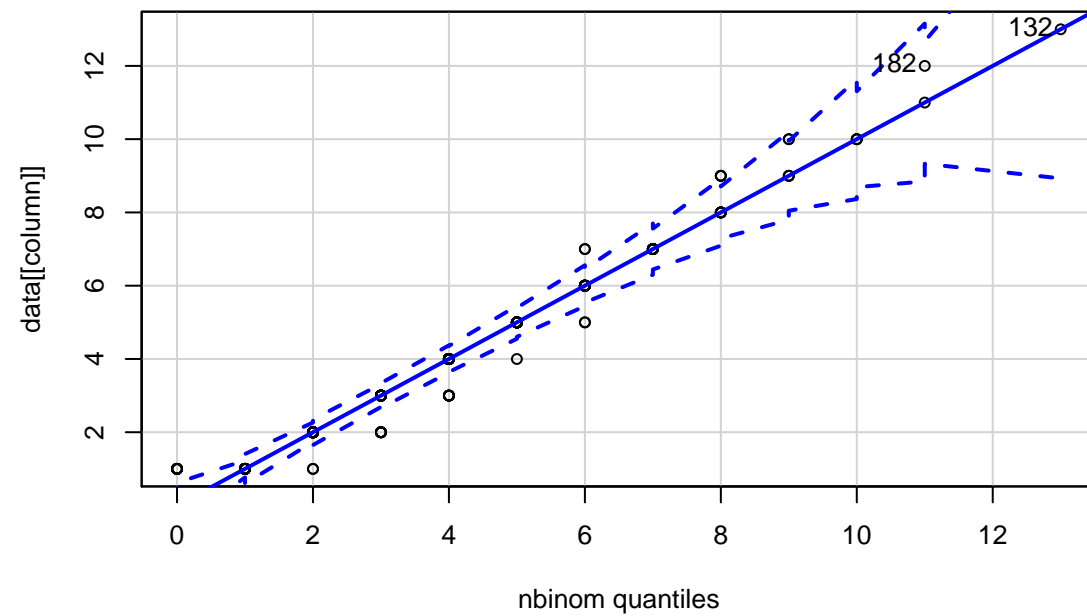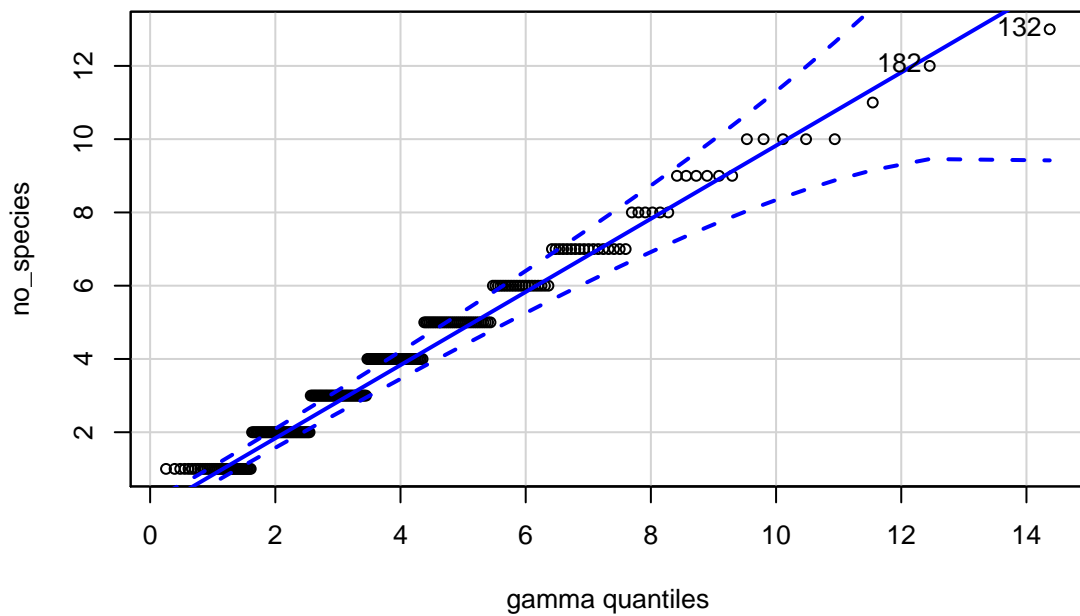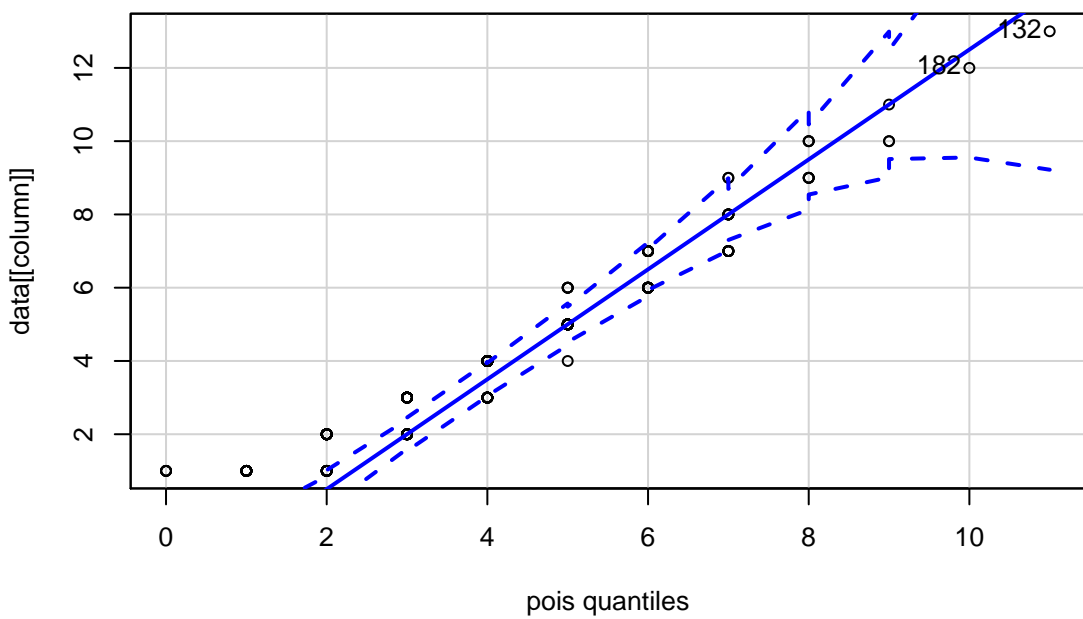
Normal distribution

Log−normal distribution

Gamma distribution

```
Global model call: glmer(formula = no_species ~ design + log_days_since_last_haul +
    location_exposure + Exp_or_Cont + depth_m + (1 | TrapID) +
    (1 | Date_YMD), data = trap_haul_no_zero_depth, family = negative.binomial(theta = 15.2932373229237),
    control = glmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 10000)),
    na.action = "na.fail")
---
Model selection table
```

|	(Int)	dpt_m	dsg	Exp_or_Cnt	lct_exp	log_dys_snc_lst_hal	df	logLik	AICc	delta	weight
1	1.3270						4	−563.059	1134.3	0.00	0.151
17	1.1610					0.07310	5	−562.403	1135.0	0.77	0.103
2	1.2020	0.003538					5	−562.806	1135.8	1.57	0.069
3	1.2380		+				5	−562.829	1135.9	1.62	0.067
9	1.3320				+		5	−563.002	1136.2	1.97	0.056
5	1.3240			+			5	−563.057	1136.4	2.08	0.053
19	1.0270		+			0.08160	6	−562.036	1136.4	2.13	0.052
18	1.0190	0.003872				0.07492	6	−562.115	1136.6	2.29	0.048
25	1.1640				+	0.07421	6	−562.333	1137.0	2.72	0.039
21	1.1590			+		0.07307	6	−562.402	1137.1	2.86	0.036
4	1.1380	0.003125	+				6	−562.635	1137.6	3.33	0.029
10	1.1940	0.003944			+		6	−562.698	1137.7	3.45	0.027
6	1.1880	0.003661		+			6	−562.793	1137.9	3.64	0.024
11	1.2160		+		+		6	−562.817	1138.0	3.69	0.024
7	1.2360		+	+			6	−562.829	1138.0	3.72	0.023
20	0.9195	0.003332	+			0.08223	7	−561.826	1138.1	3.82	0.022
13	1.3320			+	+		6	−563.002	1138.3	4.06	0.020
26	1.0060	0.004355			+	0.07680	7	−561.982	1138.4	4.14	0.019
27	0.9859			+	+	0.08288	7	−562.000	1138.4	4.17	0.019
23	1.0270		+	+		0.08160	7	−562.036	1138.5	4.24	0.018
22	1.0060	0.003993		+		0.07486	7	−562.104	1138.7	4.38	0.017
29	1.1660			+	+	0.07425	7	−562.333	1139.1	4.84	0.013
8	1.1280	0.003229	+	+			7	−562.626	1139.7	5.42	0.010
12	1.1440	0.003263	+		+		7	−562.632	1139.7	5.44	0.010
14	1.1860	0.004017		+	+		7	−562.692	1139.8	5.56	0.009
15	1.2110		+	+	+		7	−562.815	1140.1	5.80	0.008
24	0.9110	0.003419	+	+		0.08212	8	−561.820	1140.2	5.94	0.008
28	0.9157	0.003254	+		+	0.08240	8	−561.825	1140.2	5.95	0.008
30	0.9993	0.004411		+	+	0.07672	8	−561.978	1140.5	6.26	0.007
31	0.9818		+	+	+	0.08286	8	−561.999	1140.6	6.30	0.006
16	1.1330	0.003330	+	+	+		8	−562.625	1141.8	7.55	0.003
32	0.9053	0.003318	+	+	+	0.08234	9	−561.819	1142.4	8.09	0.003

```
Models ranked by AICc(x)
Random terms (all models):
...1 | TrapID..., ...1 | Date_YMD...
```

| model	sigma	logLik	AIC	BIC	deviance	df.residual
none	1.00	−563.06	1134.12	1148.34	240.94	255.00
log_days_since_last_haul	1.00	−562.40	1134.81	1152.59	241.68	254.00
depth_m	1.00	−562.81	1135.61	1153.40	240.70	254.00
design	1.00	−562.83	1135.66	1153.44	240.08	254.00
location_exposure	1.00	−563.00	1136.00	1153.79	240.38	254.00
Exp_or_Cont	1.00	−563.06	1136.11	1153.90	240.93	254.00
design + log_days_since_last_haul	1.00	−562.04	1136.07	1157.41	240.99	253.00
depth_m + log_days_since_last_haul	1.00	−562.12	1136.23	1157.57	241.51	253.00
location_exposure + log_days_since_last_haul	1.00	−562.33	1136.67	1158.01	241.14	253.00
Exp_or_Cont + log_days_since_last_haul	1.00	−562.40	1136.80	1158.15	241.67	253.00
depth_m + design	1.00	−562.63	1137.27	1158.61	239.98	253.00
depth_m + location_exposure	1.00	−562.70	1137.40	1158.74	239.83	253.00
depth_m + Exp_or_Cont	1.00	−562.79	1137.59	1158.93	240.64	253.00
design + location_exposure	1.00	−562.82	1137.63	1158.98	240.25	253.00
design + Exp_or_Cont	1.00	−562.83	1137.66	1159.00	240.07	253.00
depth_m + design + log_days_since_last_haul	1.00	−561.83	1137.65	1162.55	240.92	252.00
Exp_or_Cont + location_exposure	1.00	−563.00	1138.00	1159.34	240.38	253.00
depth_m + location_exposure + log_days_since_last_haul	1.00	−561.98	1137.96	1162.86	240.67	252.00
design + location_exposure + log_days_since_last_haul	1.00	−562.00	1138.00	1162.90	241.33	252.00
design + Exp_or_Cont + log_days_since_last_haul	1.00	−562.04	1138.07	1162.97	240.99	252.00
depth_m + Exp_or_Cont + log_days_since_last_haul	1.00	−562.10	1138.21	1163.11	241.45	252.00
Exp_or_Cont + location_exposure + log_days_since_last_haul	1.00	−562.33	1138.67	1163.56	241.14	252.00
depth_m + design + Exp_or_Cont	1.00	−562.63	1139.25	1164.15	239.95	252.00
depth_m + design + location_exposure	1.00	−562.63	1139.26	1164.16	239.88	252.00
depth_m + Exp_or_Cont + location_exposure	1.00	−562.69	1139.38	1164.28	239.82	252.00
design + Exp_or_Cont + location_exposure	1.00	−562.82	1139.63	1164.53	240.25	252.00
depth_m + design + Exp_or_Cont + log_days_since_last_haul	1.00	−561.82	1139.64	1168.10	240.89	251.00
depth_m + design + location_exposure + log_days_since_last_haul	1.00	−561.83	1139.65	1168.11	240.98	251.00
depth_m + Exp_or_Cont + location_exposure + log_days_since_last_haul	1.00	−561.98	1139.96	1168.41	240.66	251.00
design + Exp_or_Cont + location_exposure + log_days_since_last_haul	1.00	−562.00	1140.00	1168.45	241.34	251.00
depth_m + design + Exp_or_Cont + location_exposure	1.00	−562.62	1141.25	1169.70	239.87	251.00
depth_m + design + Exp_or_Cont + location_exposure + log_days_since_last_haul	1.00	−561.82	1141.64	1173.65	240.97	250.00

Predicting number of species in trap haul
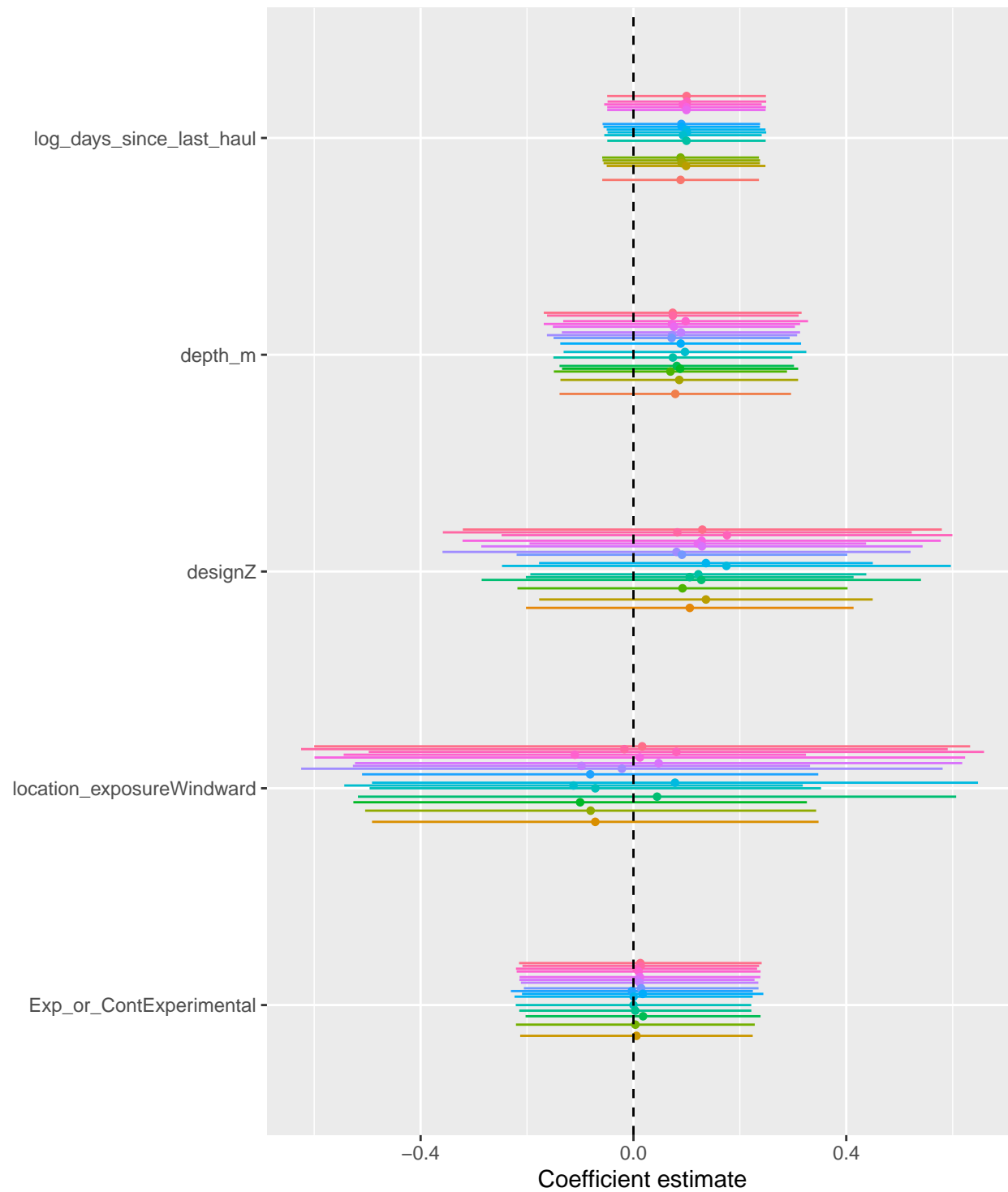
Fixed coefficients in model
(highest to lowest AIC)

- depth_m + design + Exp_or_Cont + location_exposure + log_days_since_last_haul
- depth_m + design + Exp_or_Cont + location_exposure
- design + Exp_or_Cont + location_exposure + log_days_since_last_haul
- depth_m + Exp_or_Cont + location_exposure + log_days_since_last_haul
- depth_m + design + location_exposure + log_days_since_last_haul
- depth_m + design + Exp_or_Cont + log_days_since_last_haul
- design + Exp_or_Cont + location_exposure
- depth_m + Exp_or_Cont + location_exposure
- depth_m + design + location_exposure
- depth_m + design + Exp_or_Cont
- Exp_or_Cont + location_exposure + log_days_since_last_haul
- depth_m + Exp_or_Cont + log_days_since_last_haul
- design + Exp_or_Cont + log_days_since_last_haul
- design + location_exposure + log_days_since_last_haul
- depth_m + location_exposure + log_days_since_last_haul
- Exp_or_Cont + location_exposure
- depth_m + design + log_days_since_last_haul
- design + Exp_or_Cont
- design + location_exposure
- depth_m + Exp_or_Cont
- depth_m + location_exposure
- depth_m + design
- Exp_or_Cont + log_days_since_last_haul
- location_exposure + log_days_since_last_haul
- depth_m + log_days_since_last_haul
- design + log_days_since_last_haul
- Exp_or_Cont
- location_exposure
- design
- depth_m
- log_days_since_last_haul

Models with delta AIC <2

model	sigma	logLik	AIC	BIC	deviance	df.residual
none	1.00	−563.06	1134.12	1148.34	240.94	255.00
log_days_since_last_haul	1.00	−562.40	1134.81	1152.59	241.68	254.00
depth_m	1.00	−562.81	1135.61	1153.40	240.70	254.00
design	1.00	−562.83	1135.66	1153.44	240.08	254.00
location_exposure	1.00	−563.00	1136.00	1153.79	240.38	254.00

Predicting number of species in trap haul
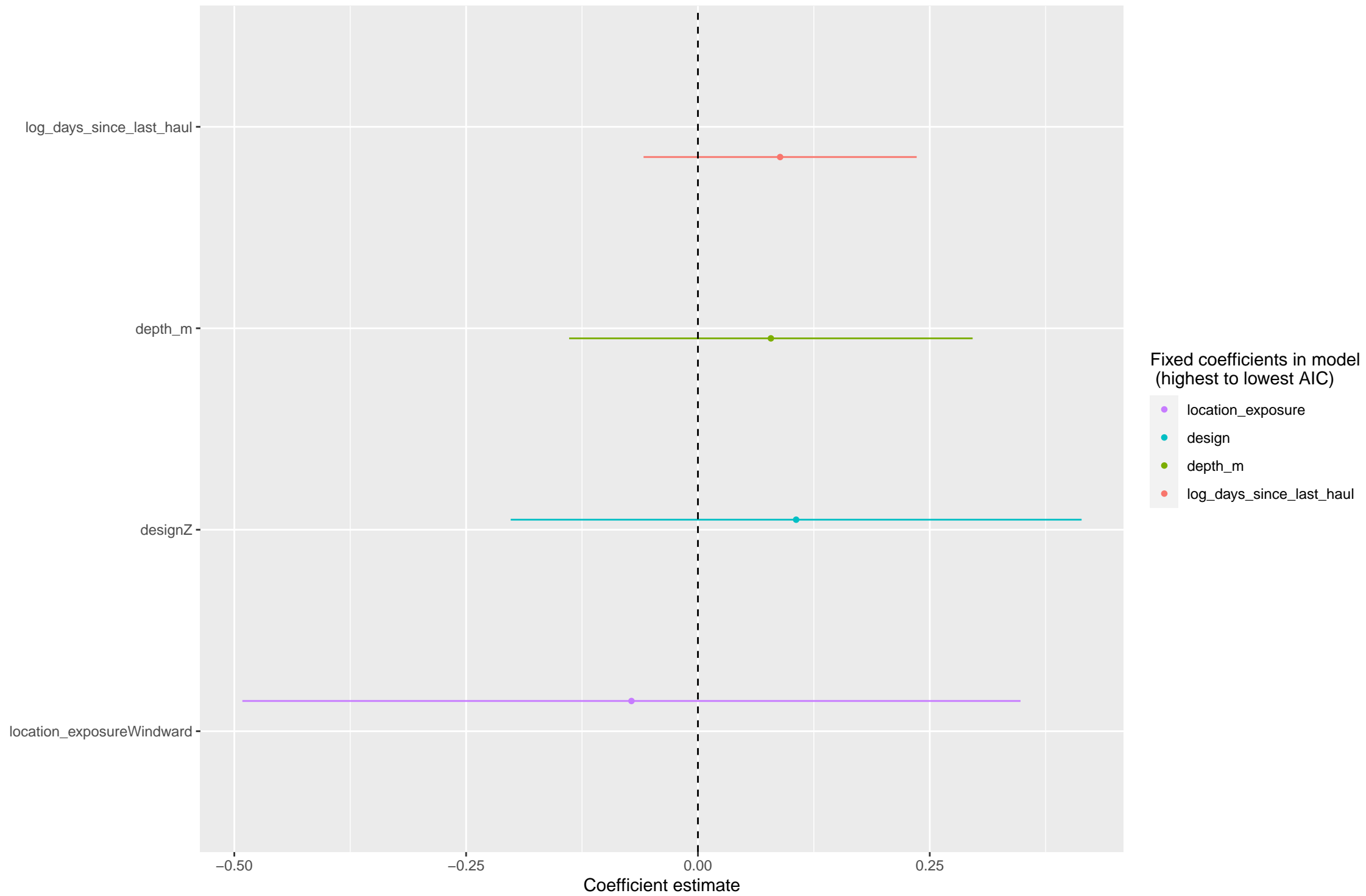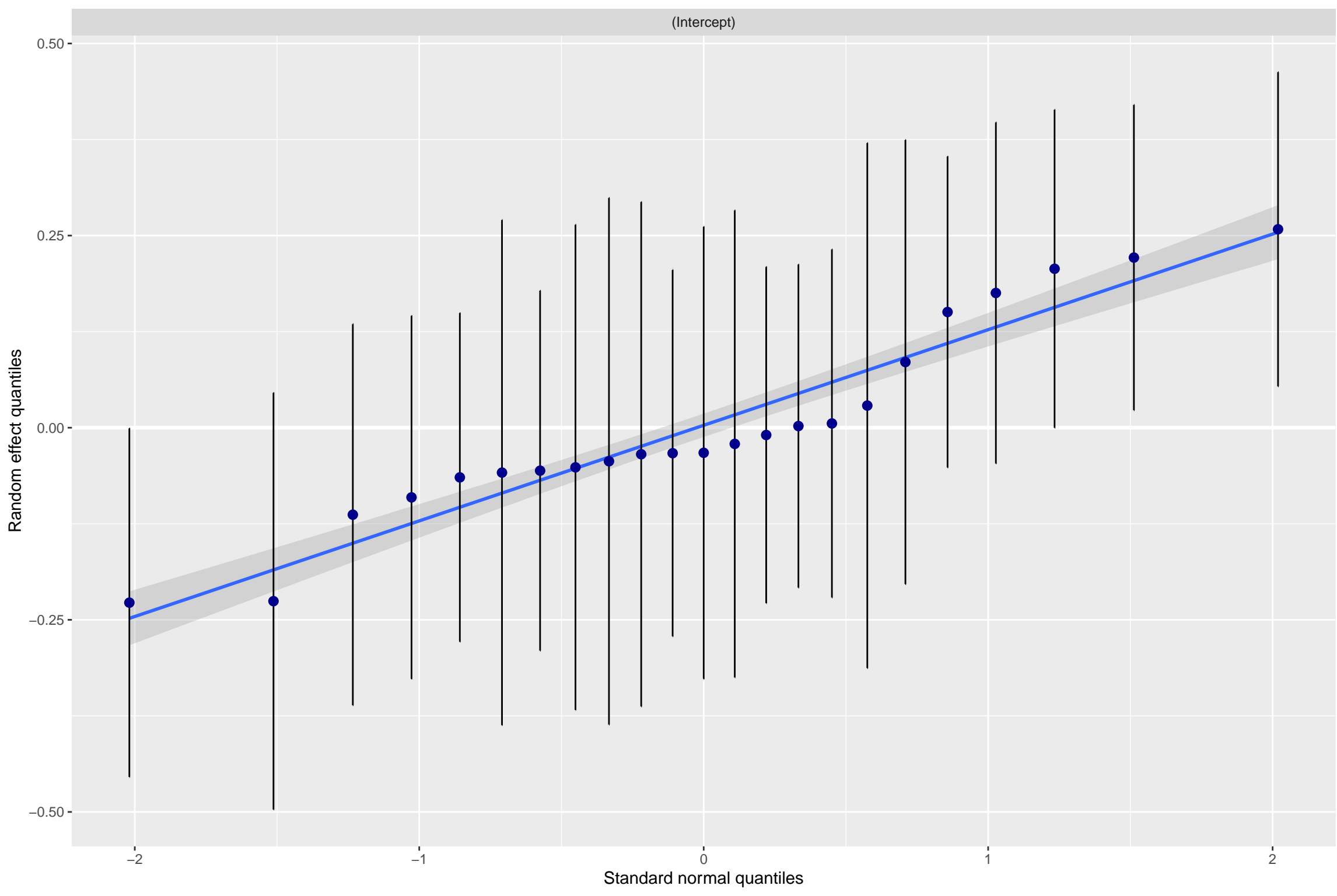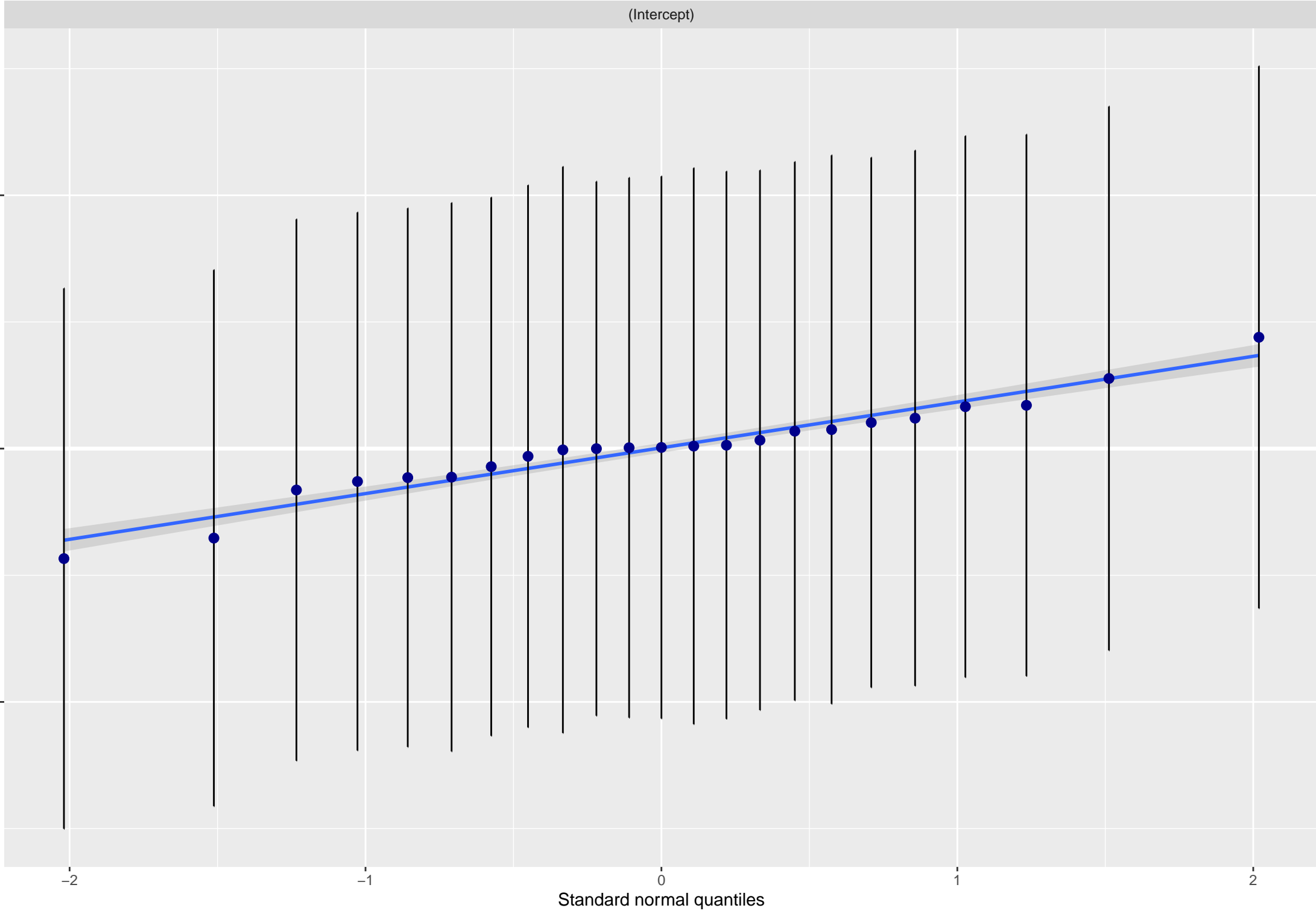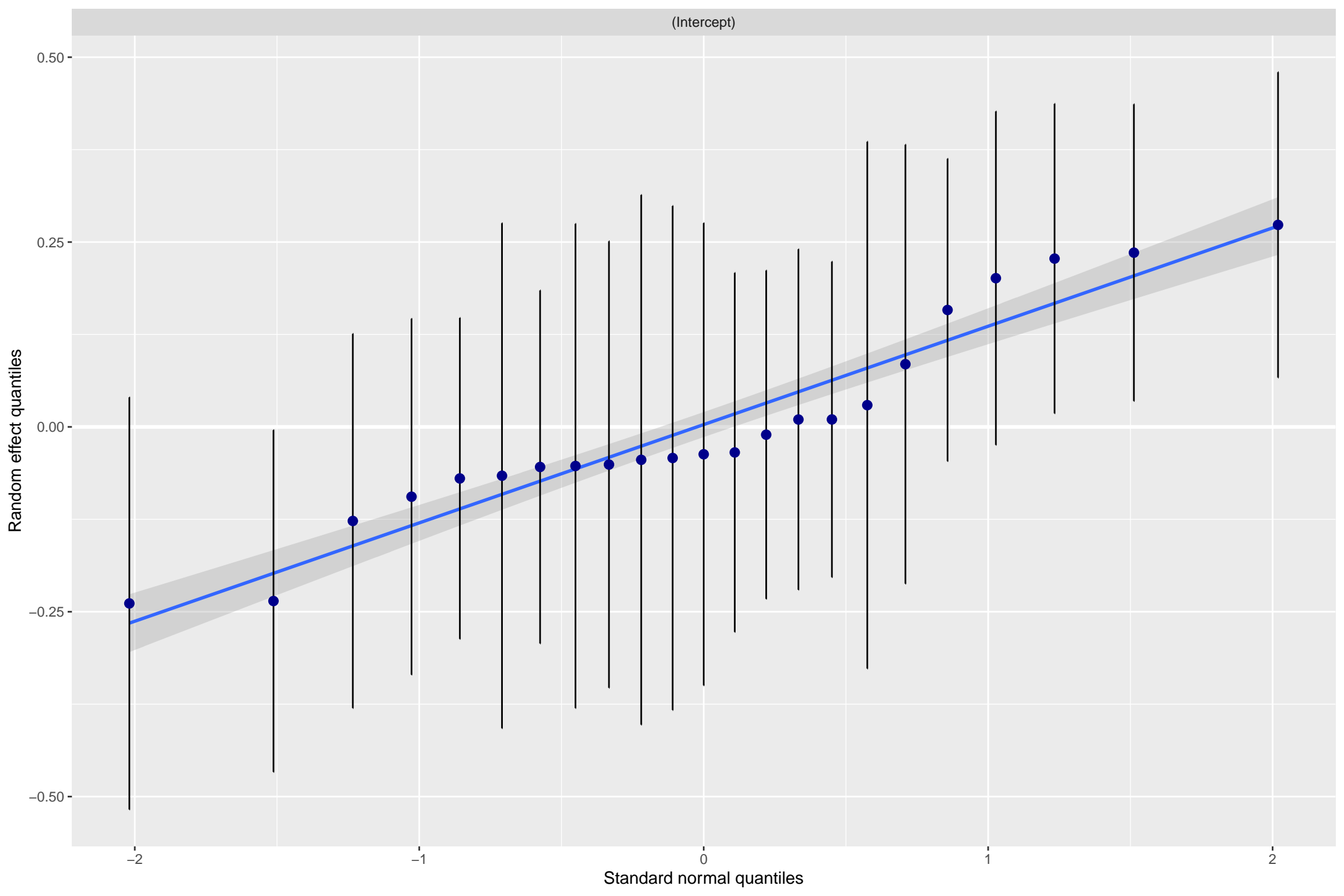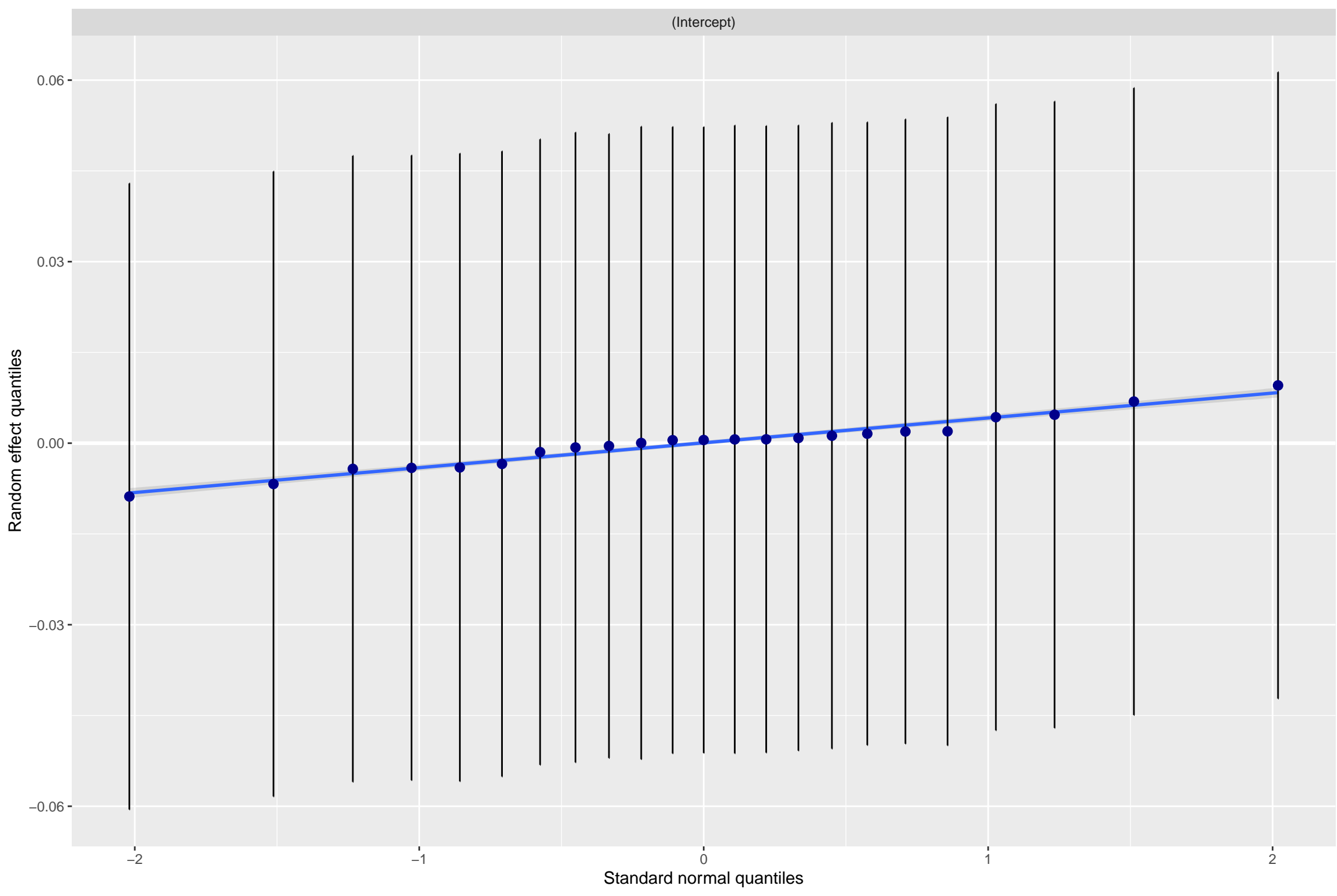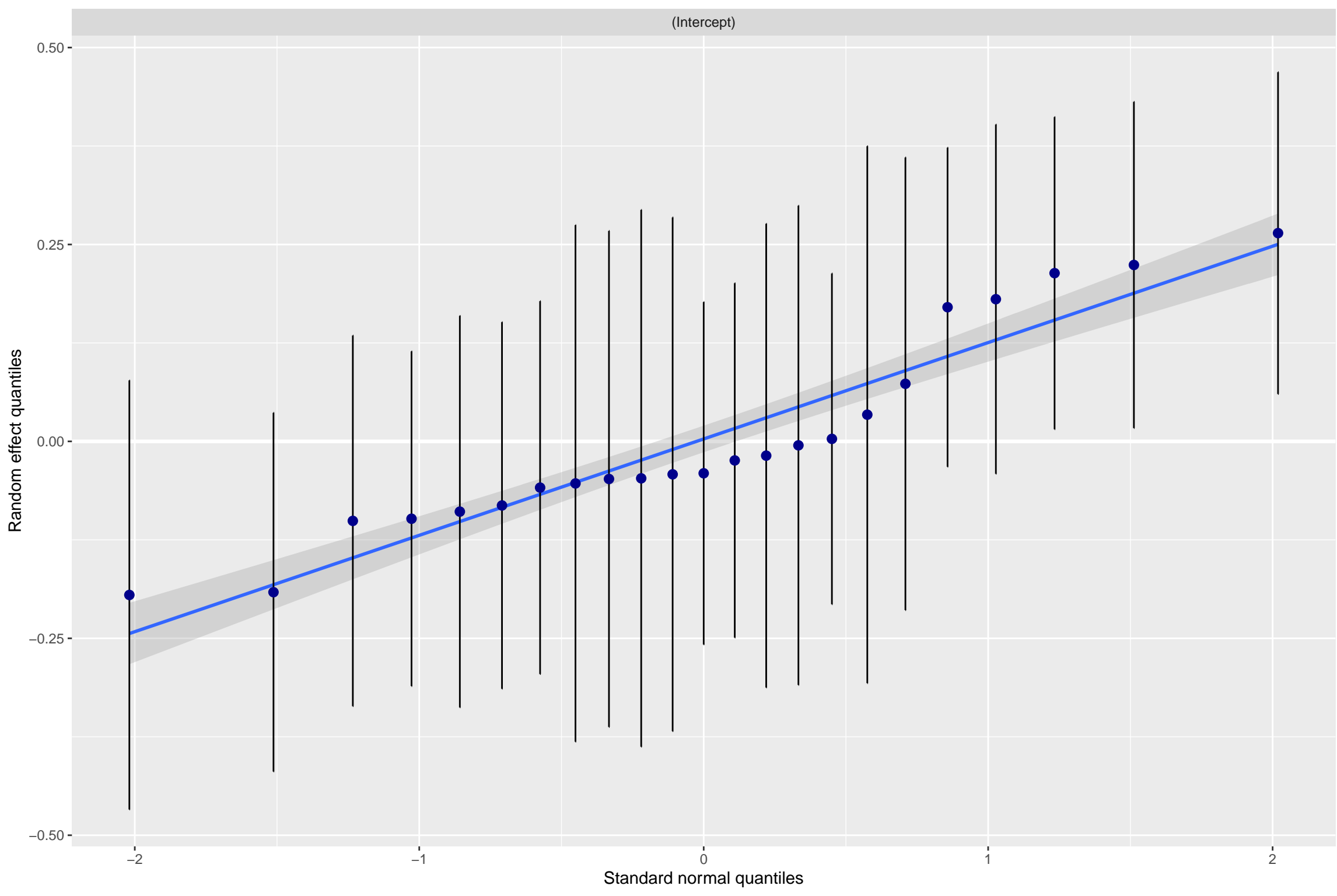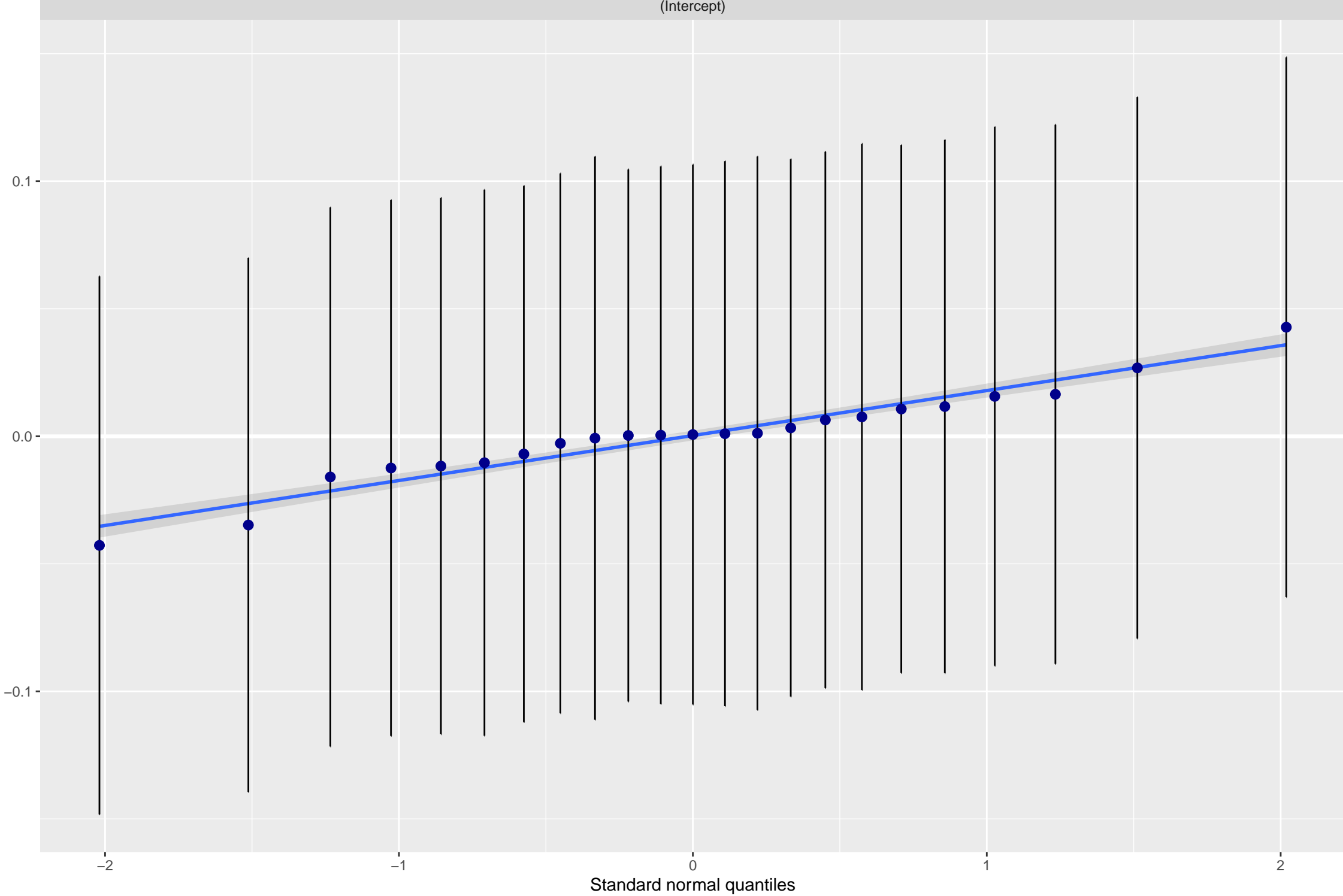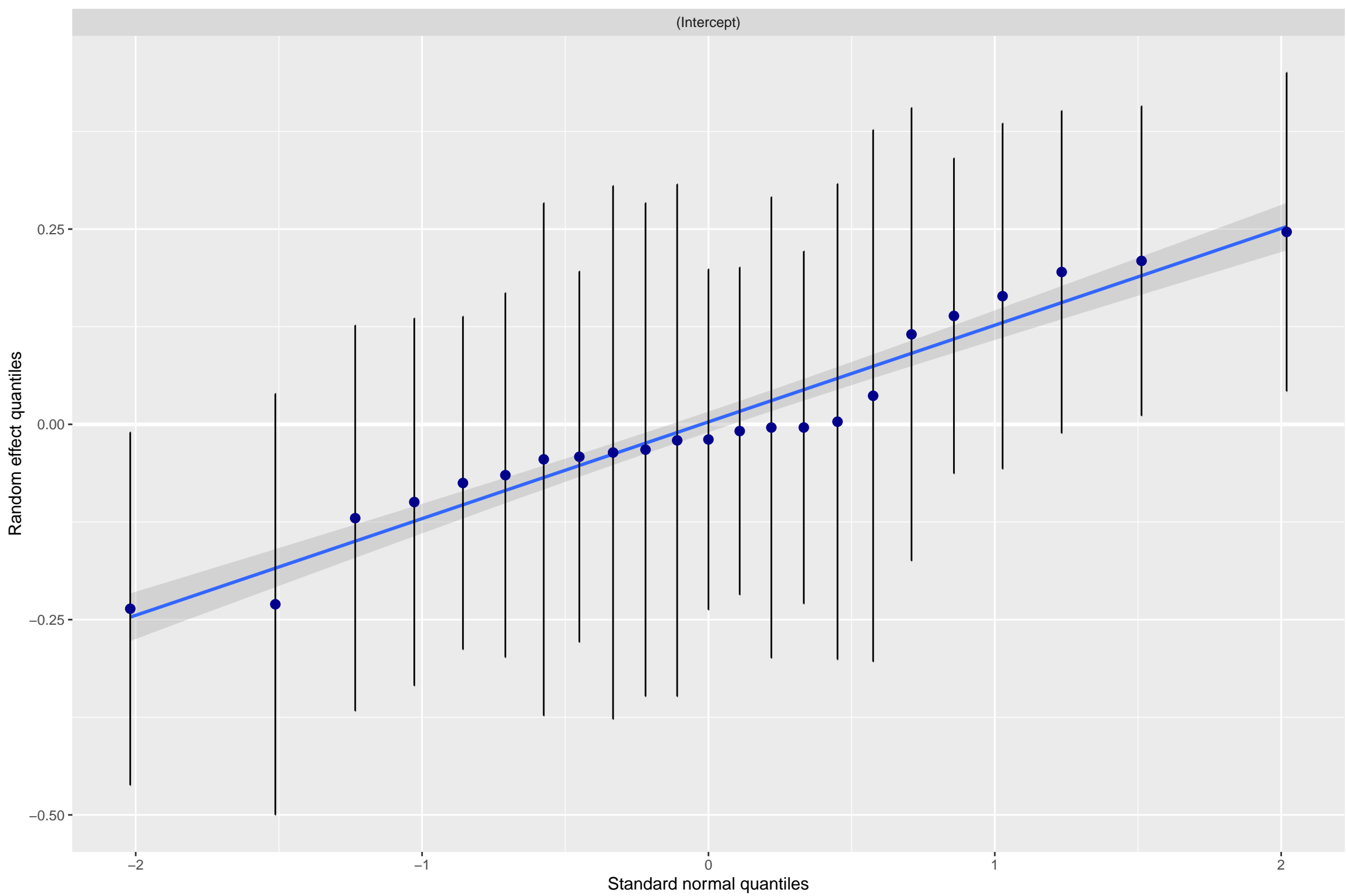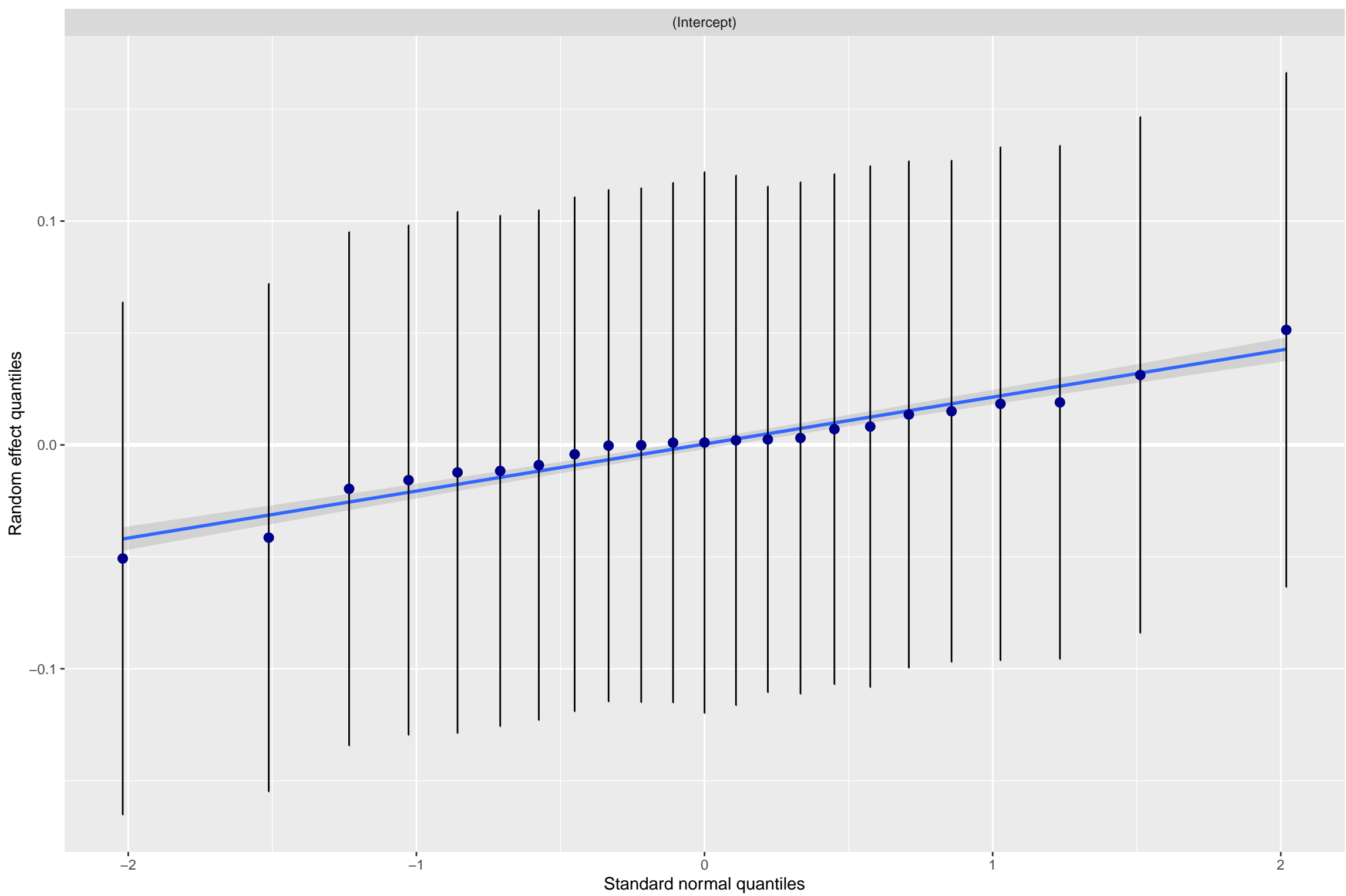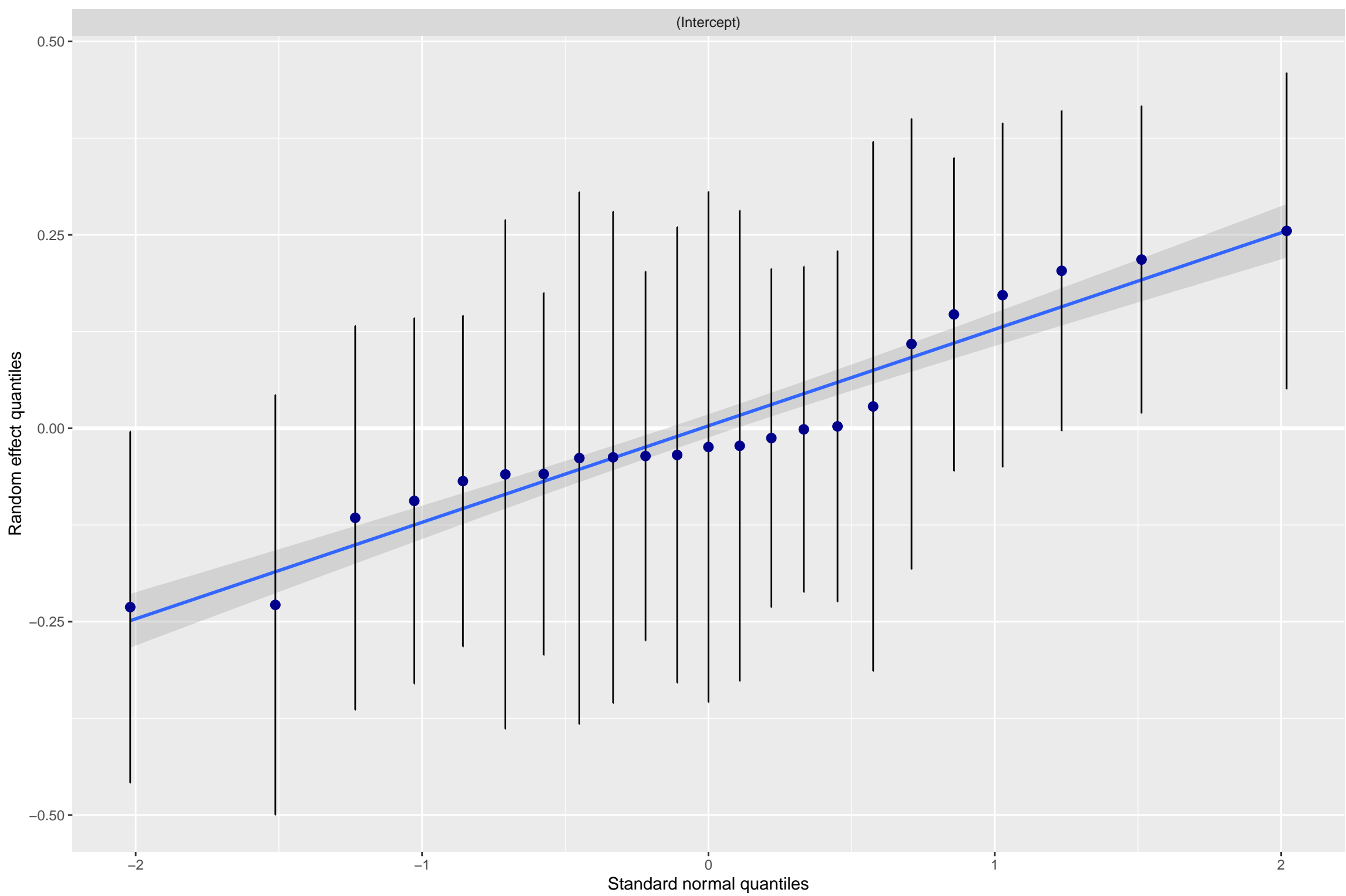
Model summaries for all models with delta AIC < 2

```
$none
Generalized linear mixed model fit by maximum likelihood (Laplace Approximation) ['glmerMod']
 Family: Negative Binomial(15.2932)  ( log )
Formula: no_species ~ (1 | TrapID) + (1 | Date_YMD)
   Data: trap_haul_no_zero_depth
Control: glmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 10000))

     AIC      BIC   logLik deviance df.resid
  1134.1   1148.3   -563.1   1126.1      255

Scaled residuals:
    Min      1Q  Median      3Q     Max
-1.4726 -0.7396 -0.2241  0.5580  3.5145

Random effects:
 Groups   Name        Variance Std.Dev.
 TrapID   (Intercept) 0.033541 0.18314
 Date_YMD (Intercept) 0.003309 0.05752
Number of obs: 259, groups:  TrapID, 23; Date_YMD, 23

Fixed effects:
            Estimate Std. Error z value Pr(>|z|)
(Intercept)  1.32727    0.05837   22.74   <2e-16 ***
---
Signif. codes:  0 ...***... 0.001 ...**... 0.01 ...*... 0.05 ....... 0.1 ... ... 1

$log_days_since_last_haul
Generalized linear mixed model fit by maximum likelihood (Laplace Approximation) ['glmerMod']
 Family: Negative Binomial(15.2932)  ( log )
Formula: no_species ~ log_days_since_last_haul + (1 | TrapID) + (1 | Date_YMD)
   Data: trap_haul_no_zero_depth
Control: glmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 10000))

     AIC      BIC   logLik deviance df.resid
  1134.8   1152.6   -562.4   1124.8      254

Scaled residuals:
    Min      1Q  Median      3Q     Max
-1.5758 -0.7379 -0.2129  0.5740  3.5168

Random effects:
 Groups   Name        Variance Std.Dev.
 TrapID   (Intercept) 0.036900 0.19209
 Date_YMD (Intercept) 0.000714 0.02672
Number of obs: 259, groups:  TrapID, 23; Date_YMD, 23

Fixed effects:
                          Estimate Std. Error z value Pr(>|z|)
(Intercept)                1.16075    0.15422   7.526 5.22e-14 ***
log_days_since_last_haul   0.07310    0.06198   1.179    0.238
---
Signif. codes:  0 ...***... 0.001 ...**... 0.01 ...*... 0.05 ....... 0.1 ... ... 1

Correlation of Fixed Effects:
            (Intr)
lg_dys_sn__ -0.924

$depth_m
Generalized linear mixed model fit by maximum likelihood (Laplace Approximation) ['glmerMod']
 Family: Negative Binomial(15.2932)  ( log )
Formula: no_species ~ depth_m + (1 | TrapID) + (1 | Date_YMD)
   Data: trap_haul_no_zero_depth
Control: glmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 10000))

     AIC      BIC   logLik deviance df.resid
  1135.6   1153.4   -562.8   1125.6      254

Scaled residuals:
    Min      1Q  Median      3Q     Max
-1.4638 -0.7515 -0.2269  0.5452  3.5303

Random effects:
 Groups   Name        Variance Std.Dev.
 TrapID   (Intercept) 0.033236 0.18231
 Date_YMD (Intercept) 0.003228 0.05681
Number of obs: 259, groups:  TrapID, 23; Date_YMD, 23

Fixed effects:
             Estimate Std. Error z value Pr(>|z|)
(Intercept) 1.201717   0.187726   6.401 1.54e-10 ***
depth_m     0.003538   0.004991   0.709    0.478
---
Signif. codes:  0 ...***... 0.001 ...**... 0.01 ...*... 0.05 ....... 0.1 ... ... 1

Correlation of Fixed Effects:
        (Intr)
depth_m -0.951
```
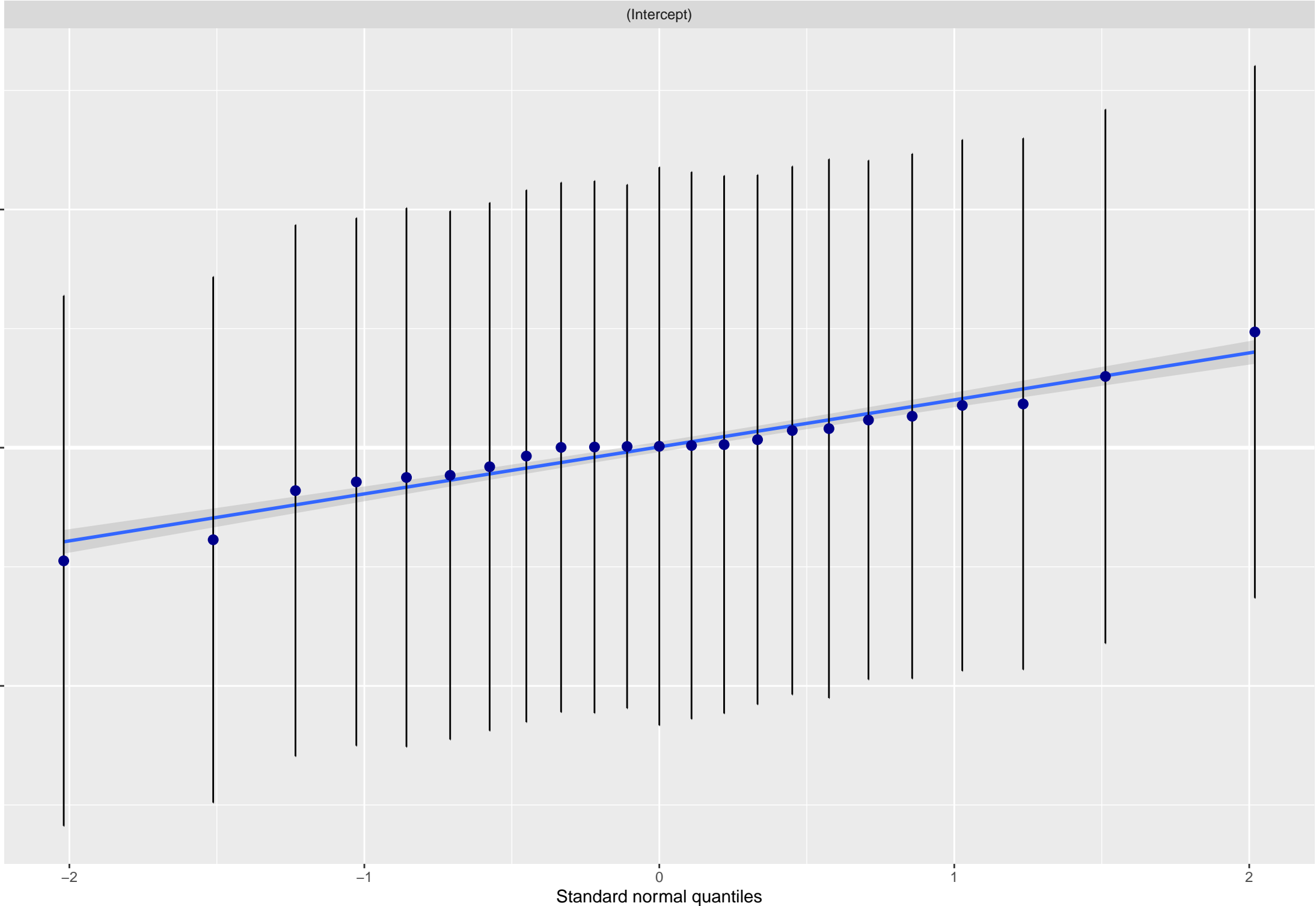
```
$design
Generalized linear mixed model fit by maximum likelihood (Laplace Approximation) ['glmerMod']
 Family: Negative Binomial(15.2932)  ( log )
Formula: no_species ~ design + (1 | TrapID) + (1 | Date_YMD)
   Data: trap_haul_no_zero_depth
Control: glmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 10000))

     AIC      BIC   logLik deviance df.resid
  1135.7   1153.4   -562.8   1125.7      254

Scaled residuals:
    Min      1Q  Median      3Q     Max
-1.4751 -0.7343 -0.2275  0.5552  3.4956

Random effects:
 Groups   Name        Variance Std.Dev.
 TrapID   (Intercept) 0.033047 0.1818
 Date_YMD (Intercept) 0.003881 0.0623
Number of obs: 259, groups:  TrapID, 23; Date_YMD, 23

Fixed effects:
            Estimate Std. Error z value Pr(>|z|)
(Intercept)  1.2376     0.1461   8.470   <2e-16 ***
designZ      0.1059     0.1571   0.674      0.5
---
Signif. codes:  0 ...***... 0.001 ...**... 0.01 ...*... 0.05 ....... 0.1 ... ... 1

Correlation of Fixed Effects:
        (Intr)
designZ -0.918

$location_exposure
Generalized linear mixed model fit by maximum likelihood (Laplace Approximation) ['glmerMod']
 Family: Negative Binomial(15.2932)  ( log )
Formula: no_species ~ location_exposure + (1 | TrapID) + (1 | Date_YMD)
   Data: trap_haul_no_zero_depth
Control: glmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 10000))

     AIC      BIC   logLik deviance df.resid
  1136.0   1153.8   -563.0   1126.0      254

Scaled residuals:
    Min      1Q  Median      3Q     Max
-1.4736 -0.7367 -0.2310  0.5544  3.5065

Random effects:
 Groups   Name        Variance Std.Dev.
 TrapID   (Intercept) 0.033659 0.18347
 Date_YMD (Intercept) 0.003639 0.06032
Number of obs: 259, groups:  TrapID, 23; Date_YMD, 23

Fixed effects:
                          Estimate Std. Error z value Pr(>|z|)
(Intercept)                1.33245    0.06030  22.095   <2e-16 ***
location_exposureWindward -0.07171    0.21408  -0.335    0.738
---
Signif. codes:  0 ...***... 0.001 ...**... 0.01 ...*... 0.05 ....... 0.1 ... ... 1

Correlation of Fixed Effects:
            (Intr)
lctn_xpsrWn -0.249
```

Full model summary

```
 eralized linear mixed model fit by maximum likelihood (Laplace Approximation) ['glmerMod']
 mily: Negative Binomial(15.2932)  ( log )
 rmula: no_species ~ design + log_days_since_last_haul + location_exposure +        Exp_or_Cont + depth_m + (1 | TrapID) + (1 | Date_YMD)
  Data: trap_haul_no_zero_depth
 trol: glmerControl(optimizer = "bobyqa", optCtrl = list(maxfun = 10000))

     AIC      BIC   logLik deviance df.resid
 141.6   1173.6   -561.8   1123.6      250

 led residuals:
   Min      1Q  Median      3Q     Max
 5809 -0.7515 -0.2174  0.5609  3.5035

 dom effects:
 oups   Name        Variance  Std.Dev.
 apID   (Intercept) 0.0359209 0.1895
 te_YMD (Intercept) 0.0008293 0.0288
 ber of obs: 259, groups:  TrapID, 23; Date_YMD, 23

 ed effects:
                         Estimate Std. Error z value Pr(>|z|)
 tercept)               0.905006   0.310485   2.915  0.00356 **
 ignZ                   0.129618   0.229857   0.564  0.57282
 _days_since_last_haul  0.082354   0.062865   1.310  0.19019
 ation_exposureWindward 0.016467   0.314744   0.052  0.95827
 _or_ContExperimental   0.013040   0.116395   0.112  0.91080
 th_m                   0.003320   0.005562   0.597  0.55063

 nif. codes:  0 ...***... 0.001 ...**... 0.01 ...*... 0.05 ....... 0.1 ... ... 1

 rrelation of Fixed Effects:
           (Intr) desgnZ lg____ lctn_W Ex__CE
 ignZ      -0.550
 dys_sn__  -0.569  0.164
 n_xpsrWn  -0.358  0.712  0.072
 _r_CntEx  -0.305  0.051 -0.005  0.126
 th_m      -0.422 -0.337 -0.001 -0.346  0.105
```