MCMC Diagnostics - IFLS data

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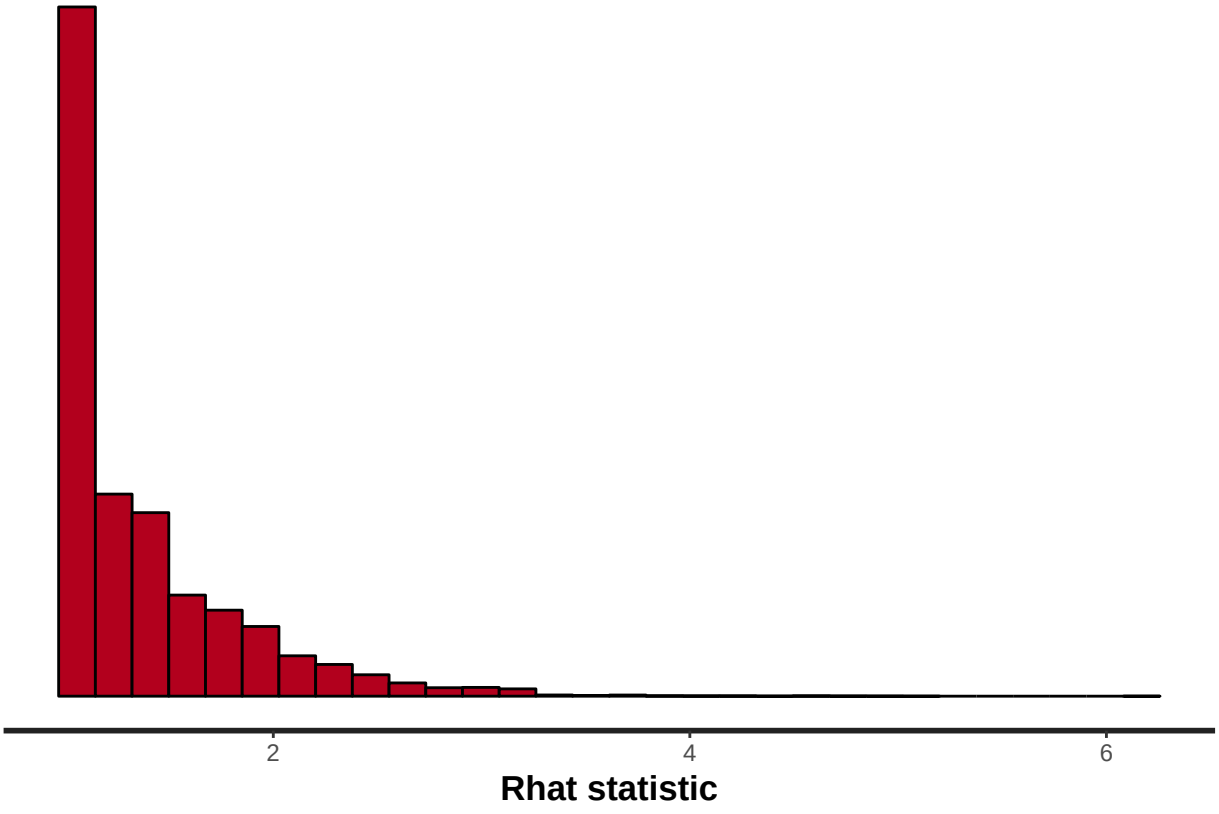
```
K <- 7
Ti <- 3
N <- 1973
```

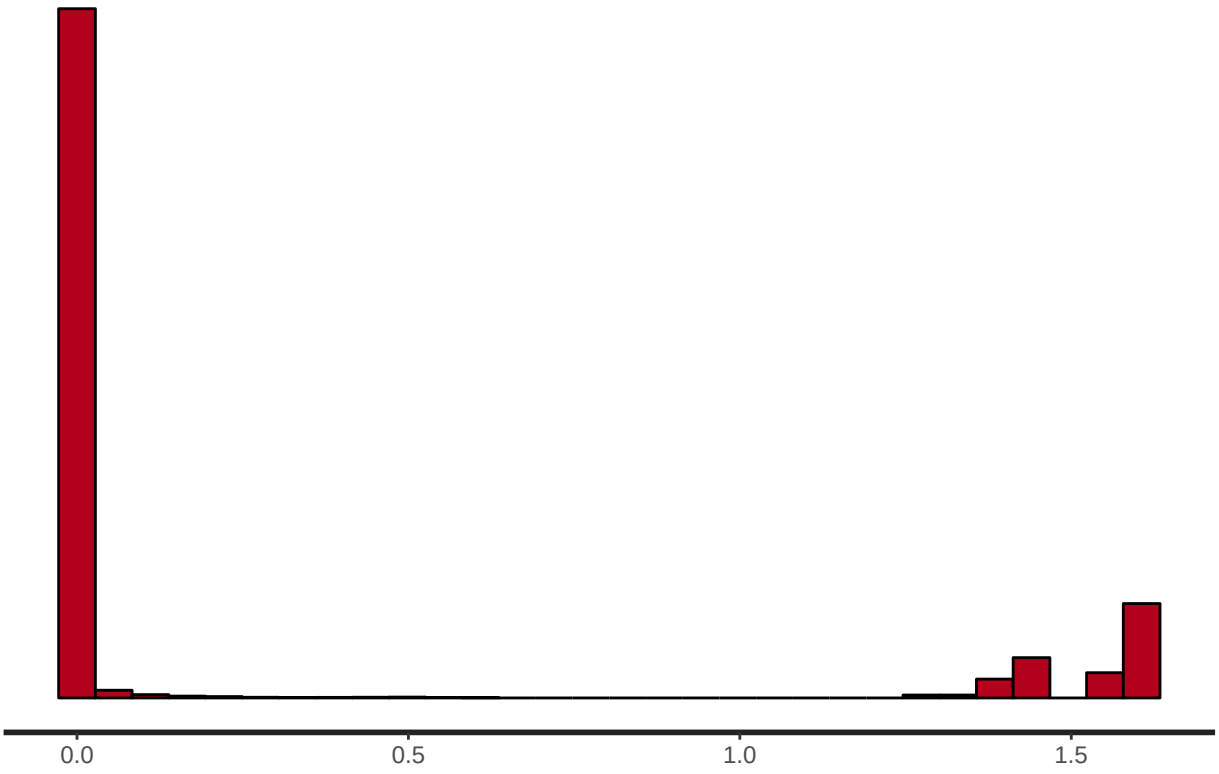
General MCMC diagnostic plots

Overall model diagnostics from rstan package.

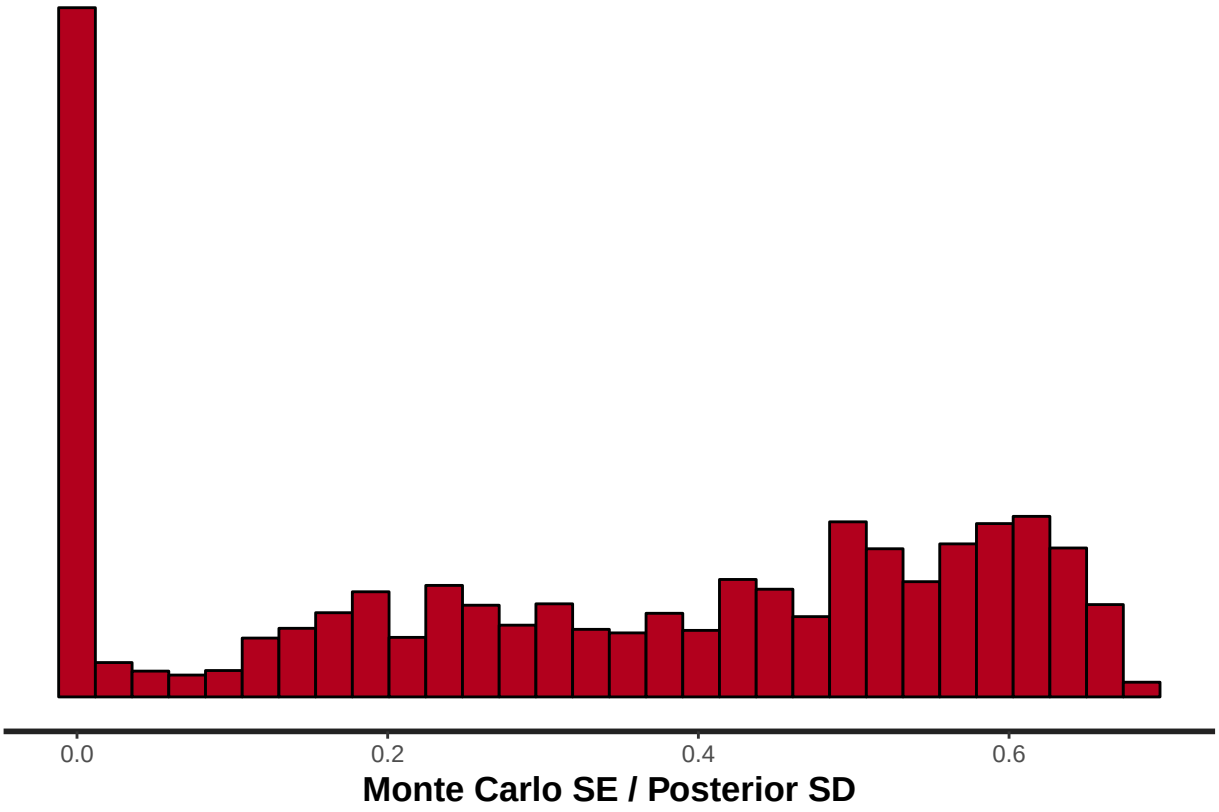
```
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
```




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




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

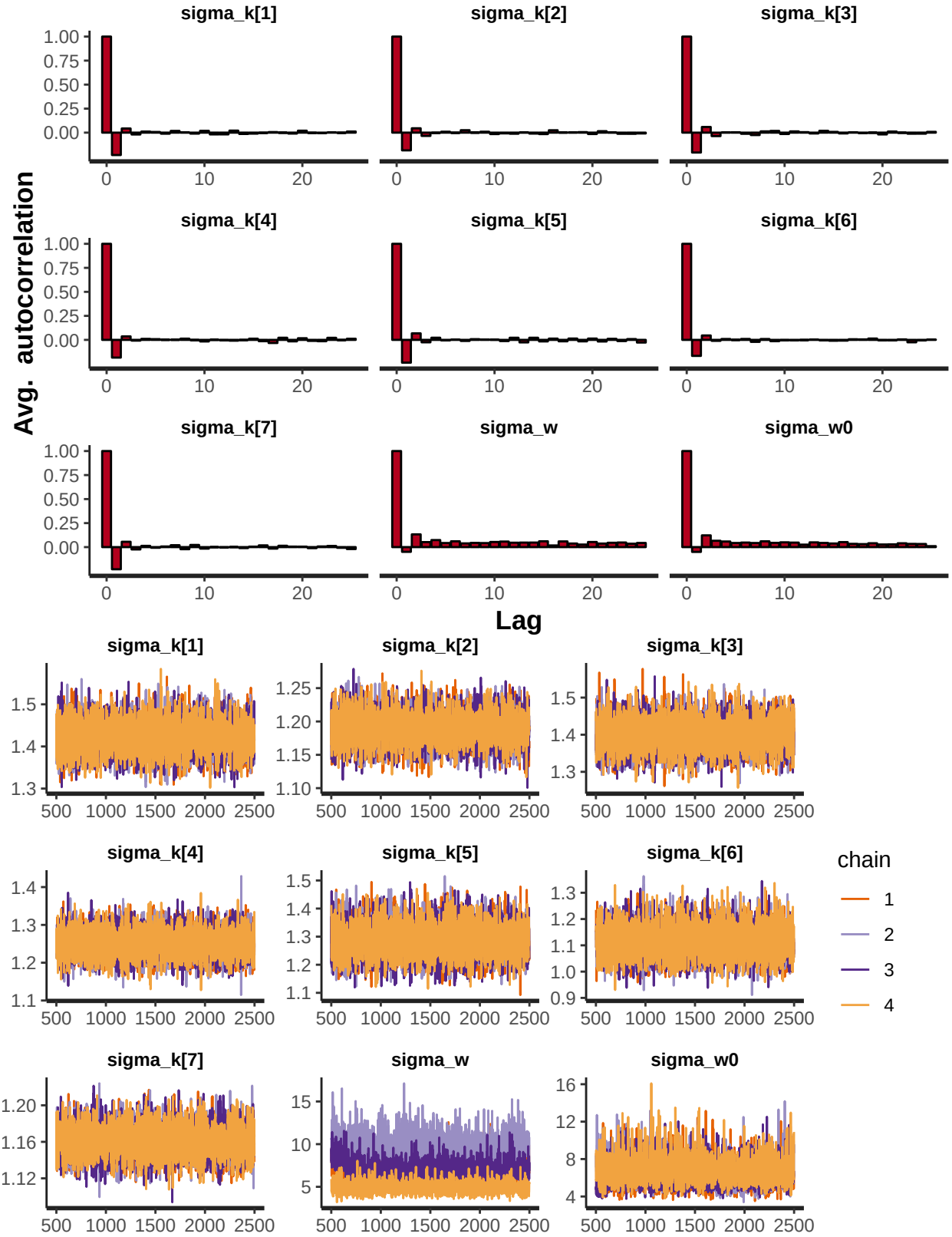


Individual Parameter Diagnostics

Individual parameter plots. Autocorrelation and trace plots for individual parameters, and histograms of posterior medians for group parameters.

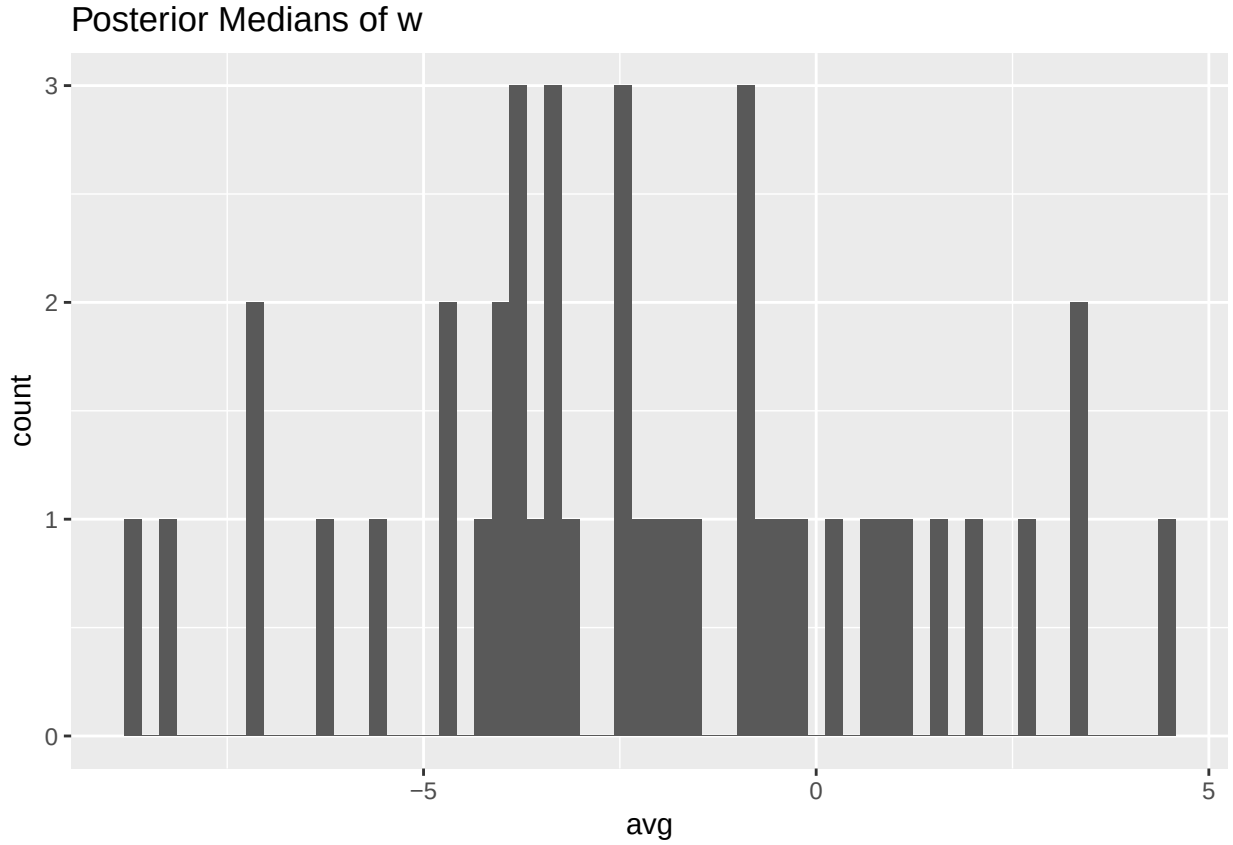
```
get_single_plots <- function(fit, param) {
  print(fit_summ[param,c(1,2,3,5,6,7,9,10)])
  print(stan_ac(fit, pars = param))
  print(rstan::traceplot(fit, pars = param))
}
get_aggreg_plots <- function(fit, param, trim = F, trim_amount) {
  ind <- grep(paste0("^",param), rownames(as.data.frame(summary(fit)$summary)))
  medians <- data.frame(avg = as.data.frame(summary(fit)$summary)$`50%`[ind])
  print(paste0("Summary statistics for posterior medians of ",param))
  print(summary(medians))
  title <- paste0("Posterior Medians of ",param)
  print(ggplot(medians, aes(x = avg)) + geom_histogram(bins = 60) + ggtitle(title))
  if (trim == T) {
    lim <- quantile(abs(medians$avg), probs = trim_amount)
    meds_trim <- medians %>% filter(abs(medians$avg) < lim)
    print(ggplot(meds_trim, aes(x = avg)) + geom_histogram(bins = 60) +
            ggtitle(paste0(title, " Without Extreme ",100*(1-trim_amount),"%")))
  }
}
plot_fit <- function(fit) {
  get_single_plots(fit, sigma_params)
  get_aggreg_plots(fit, "w")
  get_aggreg_plots(fit, "z")
  get_aggreg_plots(fit, "p")
}
plot_fit(fit)
```

```
##                mean      se_mean         sd      25%      50%      75%
## sigma_k[1] 1.422166 0.0003409899 0.03848397 1.395708 1.421003 1.447475
## sigma_k[2] 1.189277 0.0002175585 0.02342912 1.173130 1.188911 1.205128
## sigma_k[3] 1.398858 0.0003757461 0.04178130 1.370043 1.397583 1.426648
## sigma_k[4] 1.250455 0.0003377610 0.03526885 1.225804 1.250184 1.274274
## sigma_k[5] 1.285216 0.0005191947 0.05792979 1.245302 1.283217 1.322698
## sigma_k[6] 1.113482 0.0005728744 0.05863872 1.073058 1.110747 1.151785
## sigma_k[7] 1.160856 0.0001501514 0.01702206 1.149325 1.160535 1.172233
## sigma_w    7.389812 1.2911387028 2.09049147 5.770889 7.236004 8.774382
## sigma_w0   6.545192 0.1180110871 1.39359404 5.574619 6.335714 7.275019
##                   n_eff      Rhat
## sigma_k[1] 12737.279935 0.9996956
## sigma_k[2] 11597.373531 0.9996972
## sigma_k[3] 12364.451209 0.9999244
## sigma_k[4] 10903.437513 0.9999377
## sigma_k[5] 12449.258384 0.9996907
## sigma_k[6] 10477.316508 1.0006363
## sigma_k[7] 12851.847239 1.0000509
## sigma_w        2.621507 1.9903786
## sigma_w0     139.452703 1.0250897
```

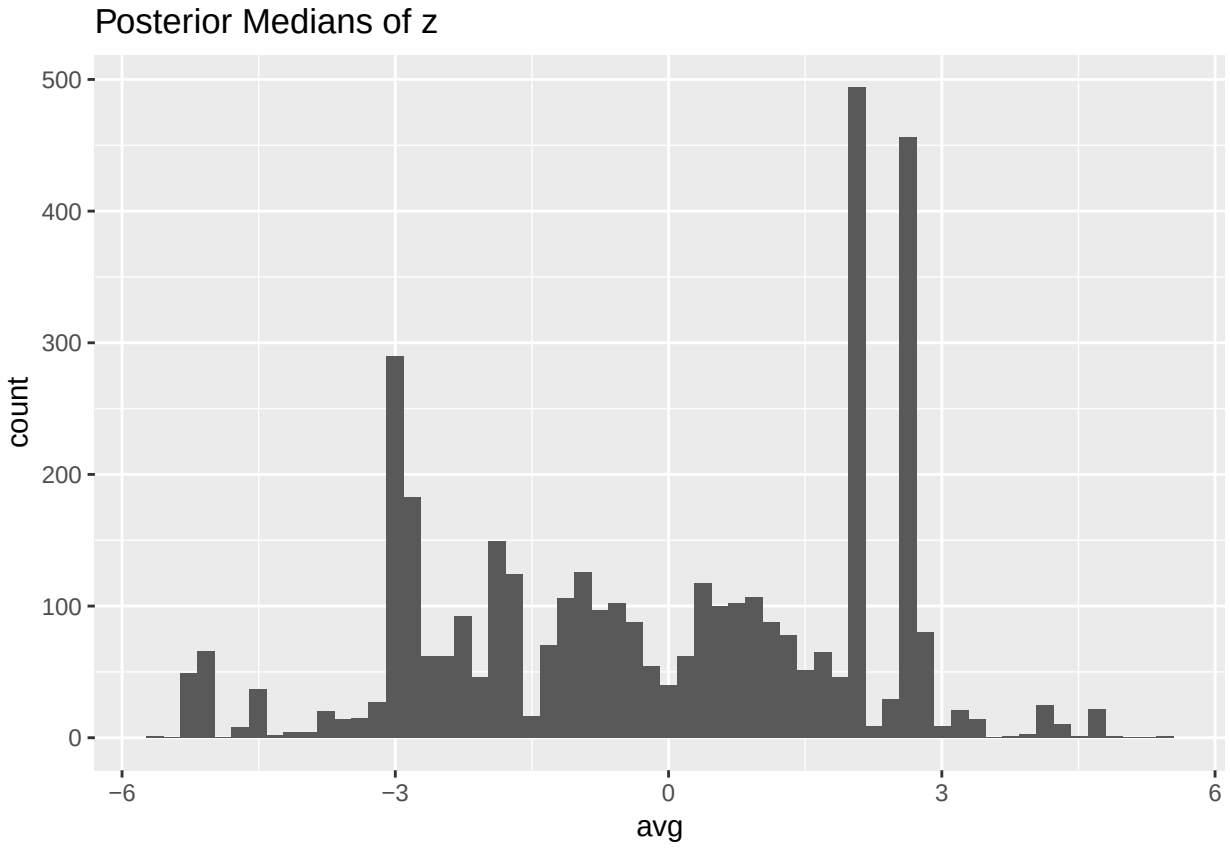



```
## [1] "Summary statistics for posterior medians of w"
##       avg
##  Min.   :-8.7177
```

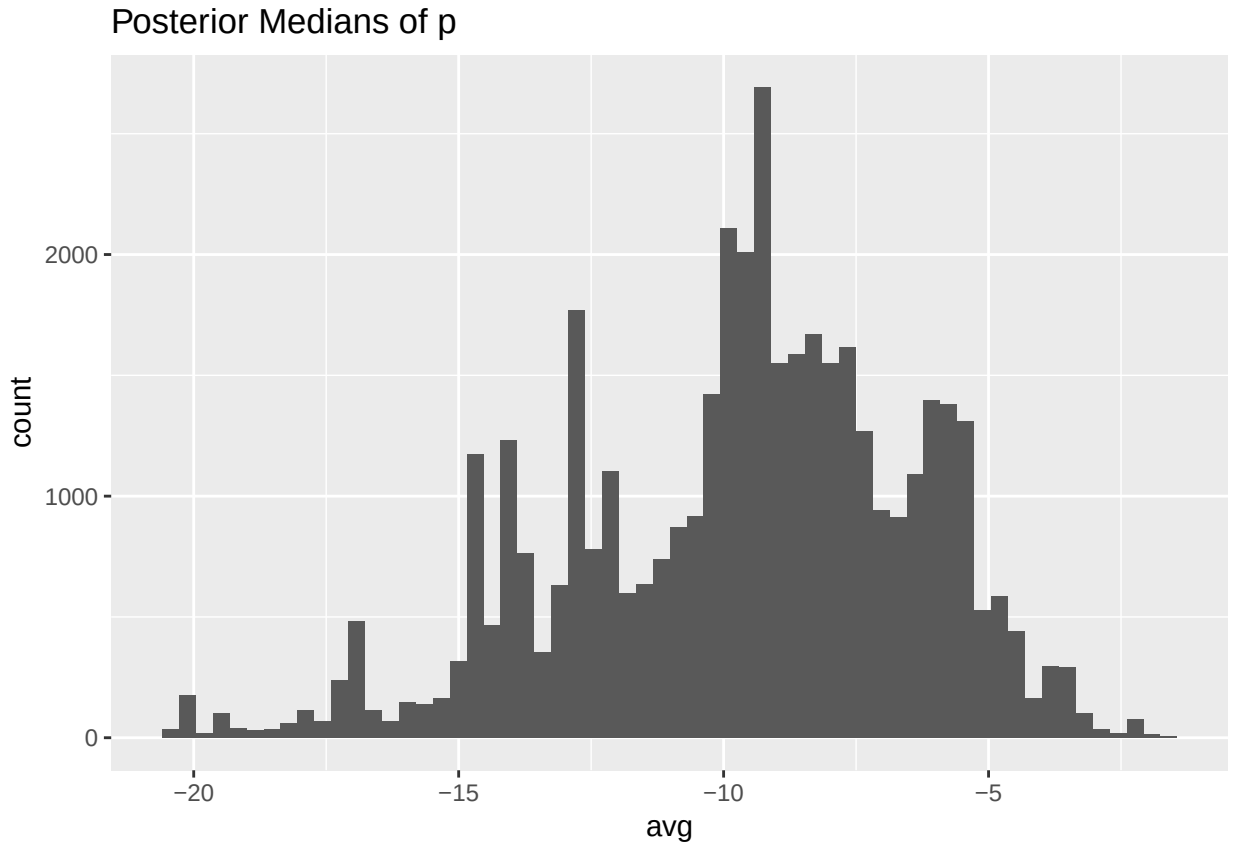
```
##  1st Qu.:-3.9469
##  Median :-2.4886
##  Mean   :-2.1833
##  3rd Qu.:-0.2349
##  Max.   : 4.4523
```




```
## [1] "Summary statistics for posterior medians of z"
##       avg
##  Min.   :-5.5756
##  1st Qu.:-1.9436
##  Median : 0.1508
##  Mean   :-0.1010
##  3rd Qu.: 2.0368
##  Max.   : 5.5171
```




```
## [1] "Summary statistics for posterior medians of p"
##       avg
##  Min.   :-20.534
##  1st Qu.:-12.071
##  Median : -9.330
##  Mean   : -9.693
##  3rd Qu.: -7.381
##  Max.   : -1.692
```


Posterior Medians of p
count
2000
1000
0
−20
−15
−10
−5
avg