MCMC Diagnostics - IFLS data

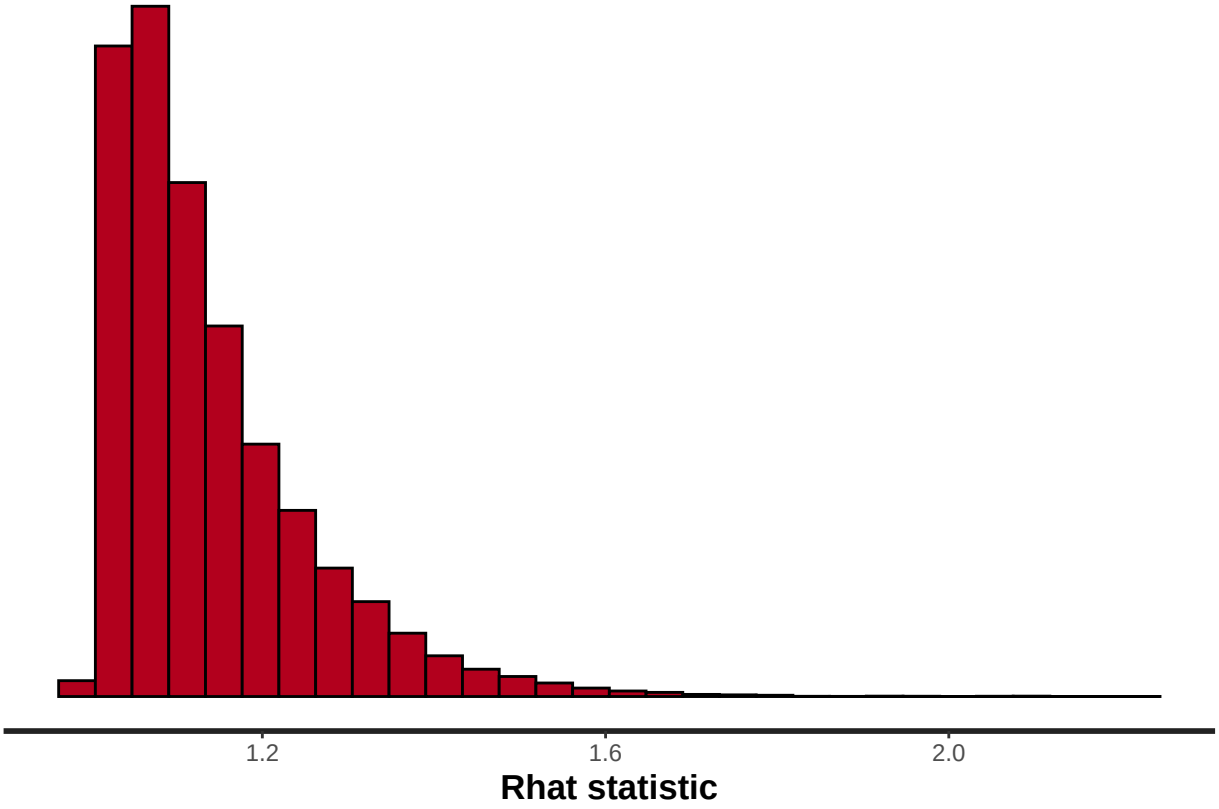
Sarah Teichman

04/15/2021

General MCMC diagnostic plots

Overall model diagnostics from rstan package.

```
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
## Warning: Removed 3955 rows containing non-finite values (stat_bin).
```

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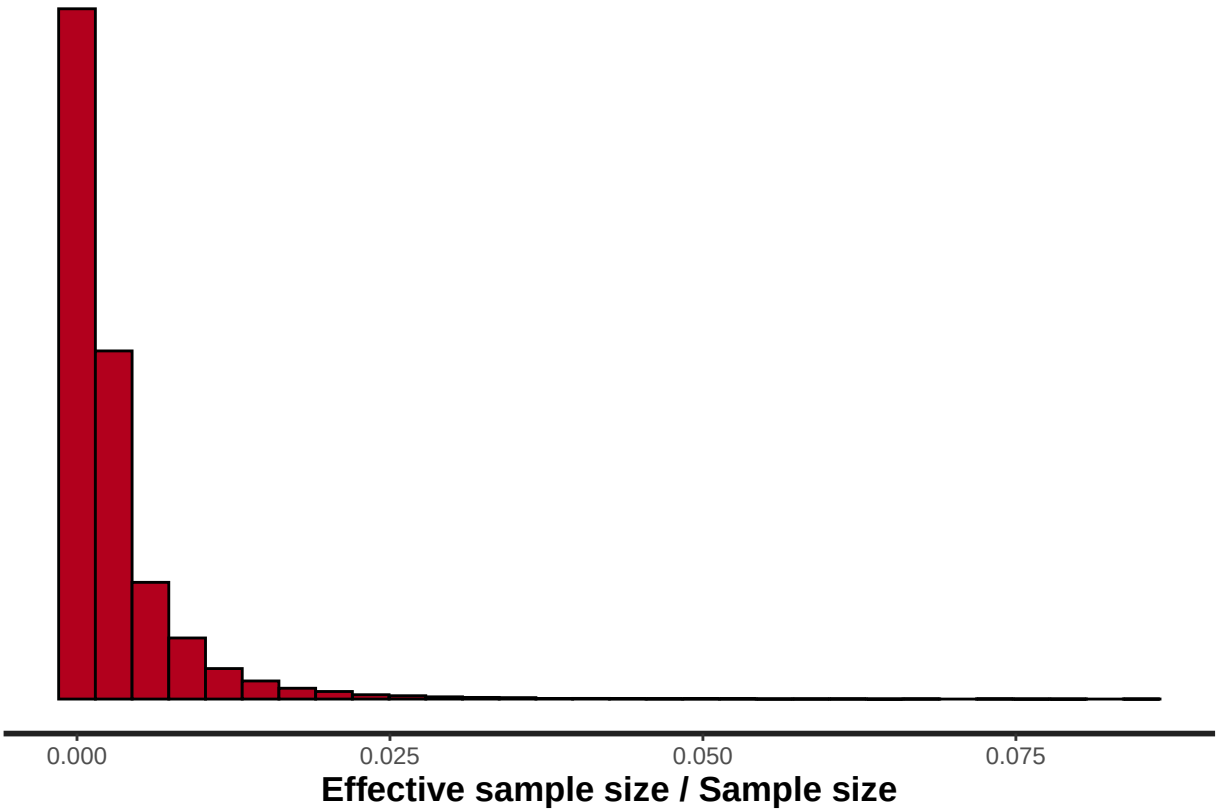
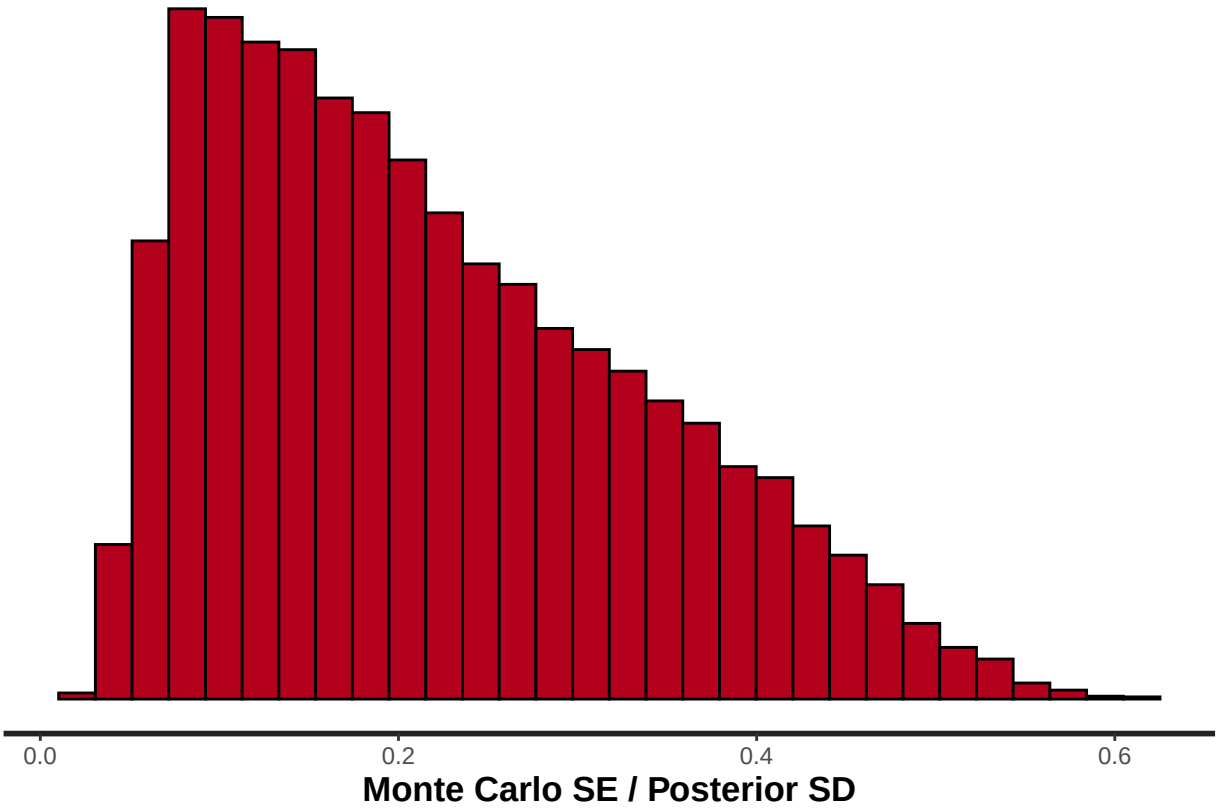
```




```
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
## Warning: Removed 3955 rows containing non-finite values (stat_bin).
```



Individual Parameter Diagnostics

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

```
##                mean     se_mean          sd        25%        50%       75%
## tau_w0    0.2091573 0.006831318 0.07836497 0.16100507 0.18980838 0.2493870
## tau_w     0.3699027 0.010938874 0.11466621 0.28964324 0.35575140 0.4265489
## tau       1.7340533 0.023603788 0.06329047 1.68973283 1.73633781 1.7803637
## tau_k[1]  0.9538597 0.010317450 0.06301049 0.91227140 0.93932504 0.9929175
## tau_k[2]  0.7455176 0.006478939 0.04658453 0.72072421 0.75004726 0.7764011
## tau_k[3]  0.7647723 0.010575713 0.07422906 0.71570444 0.76239694 0.8091885
## tau_k[4]  0.7810812 0.004723099 0.06322962 0.74916320 0.78495267 0.8184502
## tau_k[5]  0.7608579 0.051415026 0.11796873 0.65718653 0.75849391 0.8526094
## tau_k[6]  0.1230794 0.043574607 0.12260815 0.02278501 0.07626855 0.1964727
## tau_k[7]  0.6450592 0.005429795 0.03886698 0.61985641 0.64348842 0.6705583
##                n_eff     Rhat
## tau_w0    131.593646 1.030540
## tau_w     109.881781 1.047284
## tau         7.189739 1.225918
## tau_k[1]   37.297614 1.079277
## tau_k[2]   51.698218 1.074818
## tau_k[3]   49.263873 1.097461
## tau_k[4]  179.220232 1.032515
## tau_k[5]    5.264458 1.310431
## tau_k[6]    7.917203 1.271445
## tau_k[7]   51.238306 1.061637
```

```
## Warning: Ignoring unknown parameters: fun.y
```

```
## No summary function supplied, defaulting to `mean_se()`
## No summary function supplied, defaulting to `mean_se()`
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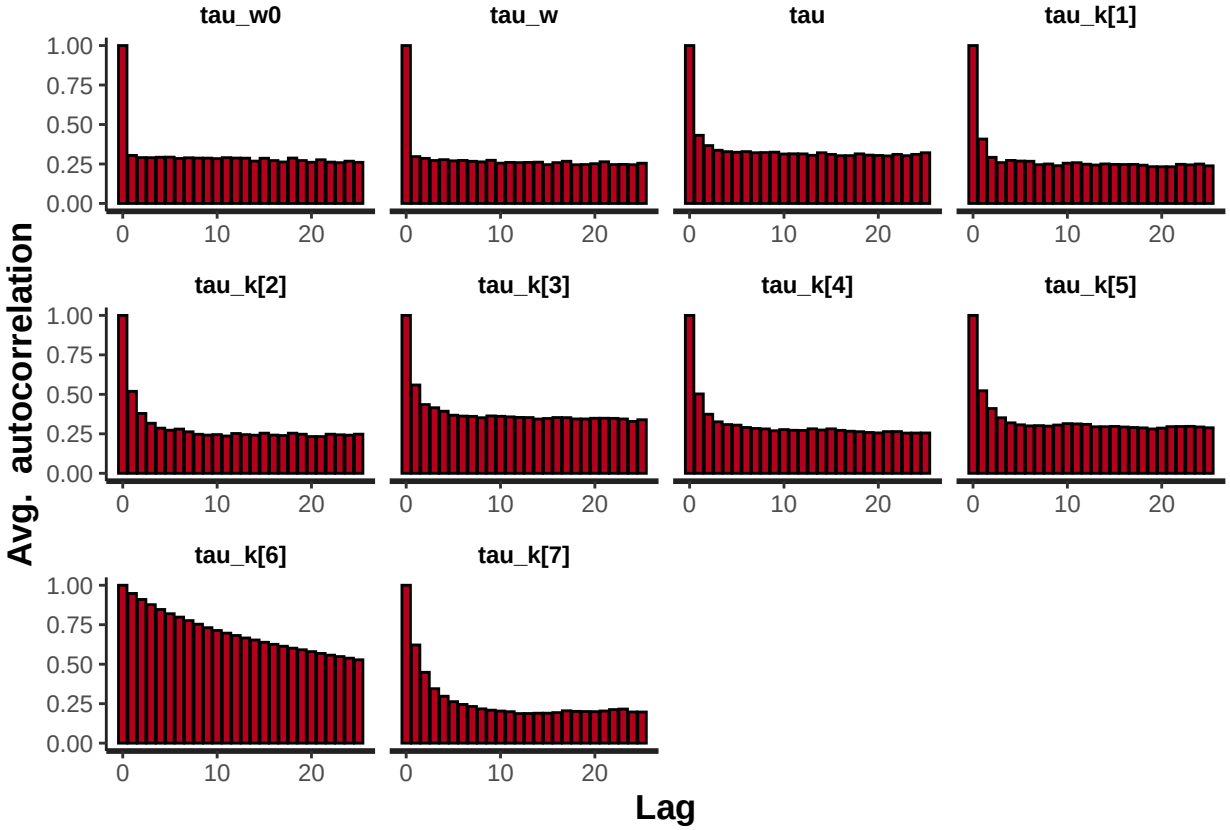
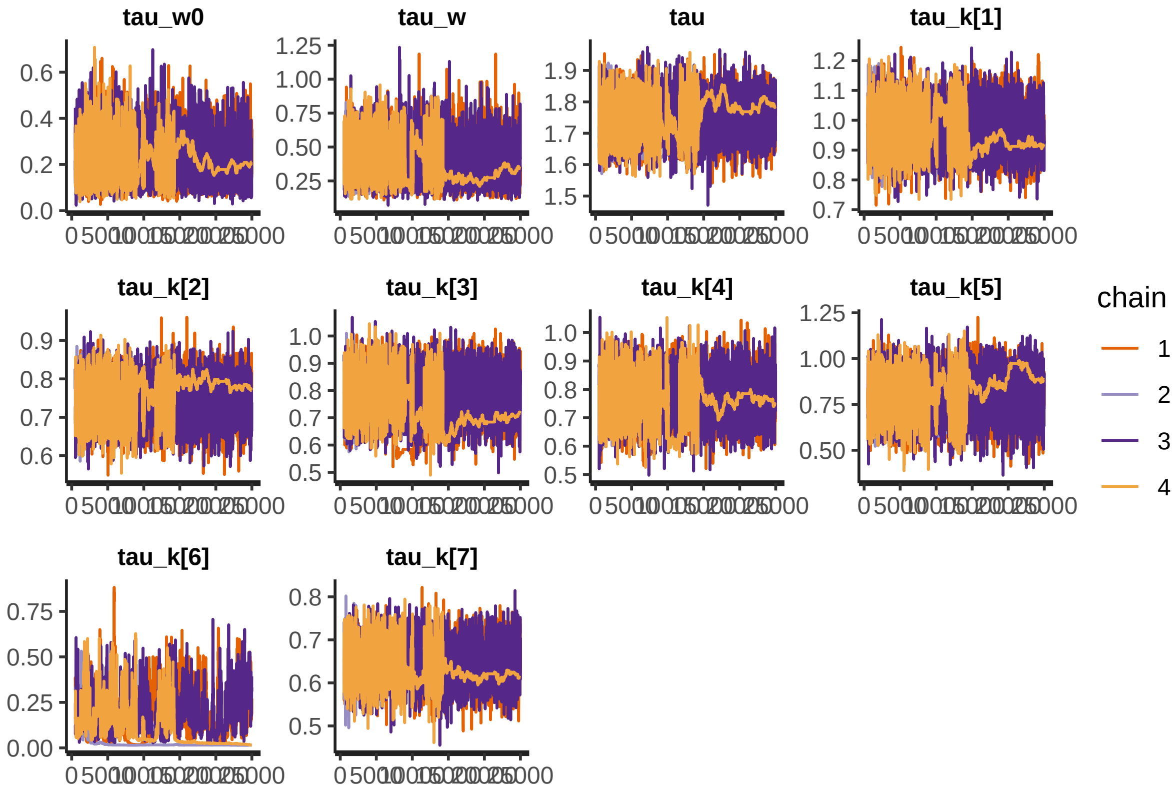
```




```
##                    mean     se_mean         sd       25%       50%       75%
## free_beta0[1] 1.9196836 0.014270602 0.14164343 1.8202570 1.9191053 2.0052588
## free_beta0[2] 1.2597781 0.018845485 0.15018995 1.1609747 1.2665170 1.3531899
## free_beta0[3] 1.3666441 0.007410204 0.13229682 1.2867344 1.3717513 1.4449031
## free_beta0[4] 0.7672962 0.055131120 0.21716342 0.6131883 0.7071361 0.8999061
## free_beta0[5] 1.3988011 0.033208768 0.17744794 1.2764807 1.3729127 1.5035572
## free_beta0[6] 2.4470855 0.028847450 0.14380494 2.3605517 2.4290578 2.5476331
## free_beta1    2.2719017 0.019805095 0.07303826 2.2218861 2.2835290 2.3282407
## free_beta2    0.7813028 0.007711346 0.04686808 0.7471459 0.7812599 0.8122649
## beta0[1]      0.0000000         NaN 0.00000000 0.0000000 0.0000000 0.0000000
## beta0[2]      1.9196836 0.014270602 0.14164343 1.8202570 1.9191053 2.0052588
## beta0[3]      1.2597781 0.018845485 0.15018995 1.1609747 1.2665170 1.3531899
## beta0[4]      1.3666441 0.007410204 0.13229682 1.2867344 1.3717513 1.4449031
## beta0[5]      0.7672962 0.055131120 0.21716342 0.6131883 0.7071361 0.8999061
## beta0[6]      1.3988011 0.033208768 0.17744794 1.2764807 1.3729127 1.5035572
```

```
## beta0[7]      2.4470855 0.028847450 0.14380494 2.3605517 2.4290578 2.5476331
## beta1[1]      0.0000000         NaN 0.00000000 0.0000000 0.0000000 0.0000000
## beta1[2]      2.2719017 0.019805095 0.07303826 2.2218861 2.2835290 2.3282407
## beta1[3]      2.2719017 0.019805095 0.07303826 2.2218861 2.2835290 2.3282407
## beta1[4]      2.2719017 0.019805095 0.07303826 2.2218861 2.2835290 2.3282407
## beta1[5]      2.2719017 0.019805095 0.07303826 2.2218861 2.2835290 2.3282407
## beta1[6]      2.2719017 0.019805095 0.07303826 2.2218861 2.2835290 2.3282407
## beta1[7]      2.2719017 0.019805095 0.07303826 2.2218861 2.2835290 2.3282407
## beta2[1]      0.0000000         NaN 0.00000000 0.0000000 0.0000000 0.0000000
## beta2[2]      0.7813028 0.007711346 0.04686808 0.7471459 0.7812599 0.8122649
## beta2[3]      0.7813028 0.007711346 0.04686808 0.7471459 0.7812599 0.8122649
## beta2[4]      0.7813028 0.007711346 0.04686808 0.7471459 0.7812599 0.8122649
## beta2[5]      0.7813028 0.007711346 0.04686808 0.7471459 0.7812599 0.8122649
## beta2[6]      0.7813028 0.007711346 0.04686808 0.7471459 0.7812599 0.8122649
## beta2[7]      0.7813028 0.007711346 0.04686808 0.7471459 0.7812599 0.8122649
##                   n_eff     Rhat
## free_beta0[1]  98.51634 1.042967
## free_beta0[2]  63.51366 1.065577
## free_beta0[3] 318.74138 1.016384
## free_beta0[4]  15.51600 1.143363
## free_beta0[5]  28.55199 1.097037
## free_beta0[6]  24.85036 1.071190
## free_beta1     13.60025 1.110140
## free_beta2     36.93975 1.064379
## beta0[1]            NaN      NaN
## beta0[2]       98.51634 1.042967
## beta0[3]       63.51366 1.065577
## beta0[4]      318.74138 1.016384
## beta0[5]       15.51600 1.143363
## beta0[6]       28.55199 1.097037
## beta0[7]       24.85036 1.071190
## beta1[1]            NaN      NaN
## beta1[2]       13.60025 1.110140
## beta1[3]       13.60025 1.110140
## beta1[4]       13.60025 1.110140
## beta1[5]       13.60025 1.110140
## beta1[6]       13.60025 1.110140
## beta1[7]       13.60025 1.110140
## beta2[1]            NaN      NaN
## beta2[2]       36.93975 1.064379
## beta2[3]       36.93975 1.064379
## beta2[4]       36.93975 1.064379
## beta2[5]       36.93975 1.064379
## beta2[6]       36.93975 1.064379
## beta2[7]       36.93975 1.064379
```

```
## Warning: Ignoring unknown parameters: fun.y
```




```
## Warning: Removed 312 rows containing non-finite values (stat_summary).
```

```
## No summary function supplied, defaulting to `mean_se()`
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## No summary function supplied, defaulting to `mean_se()`
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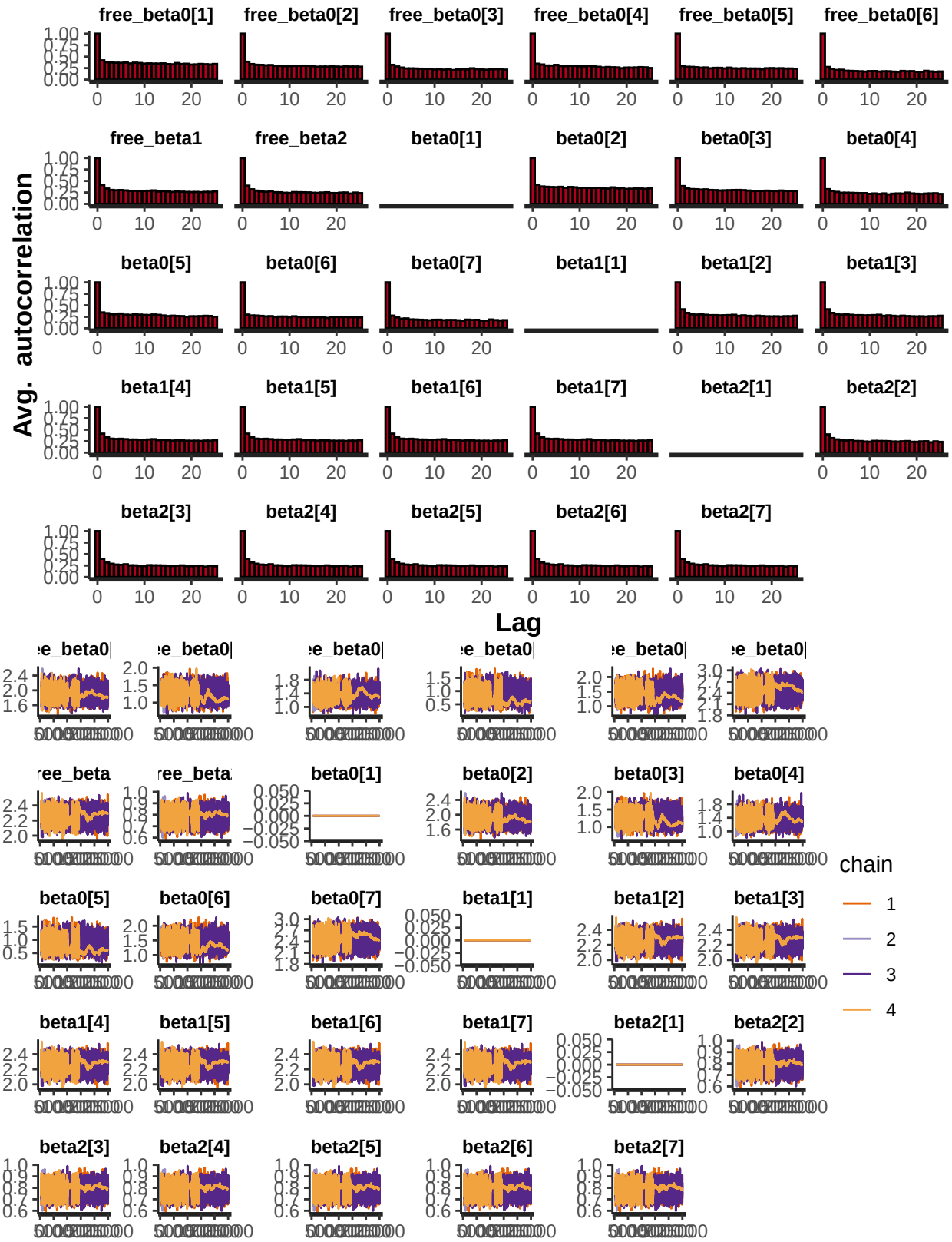
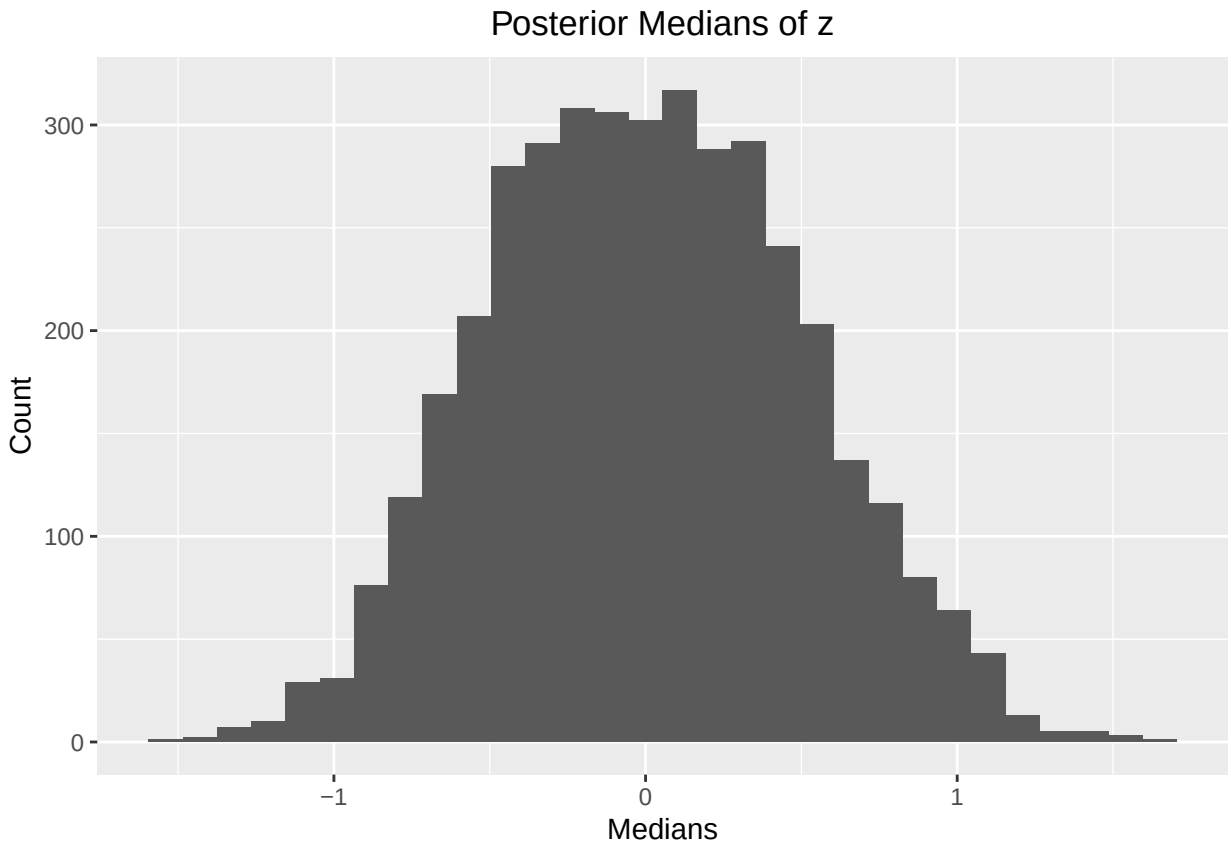
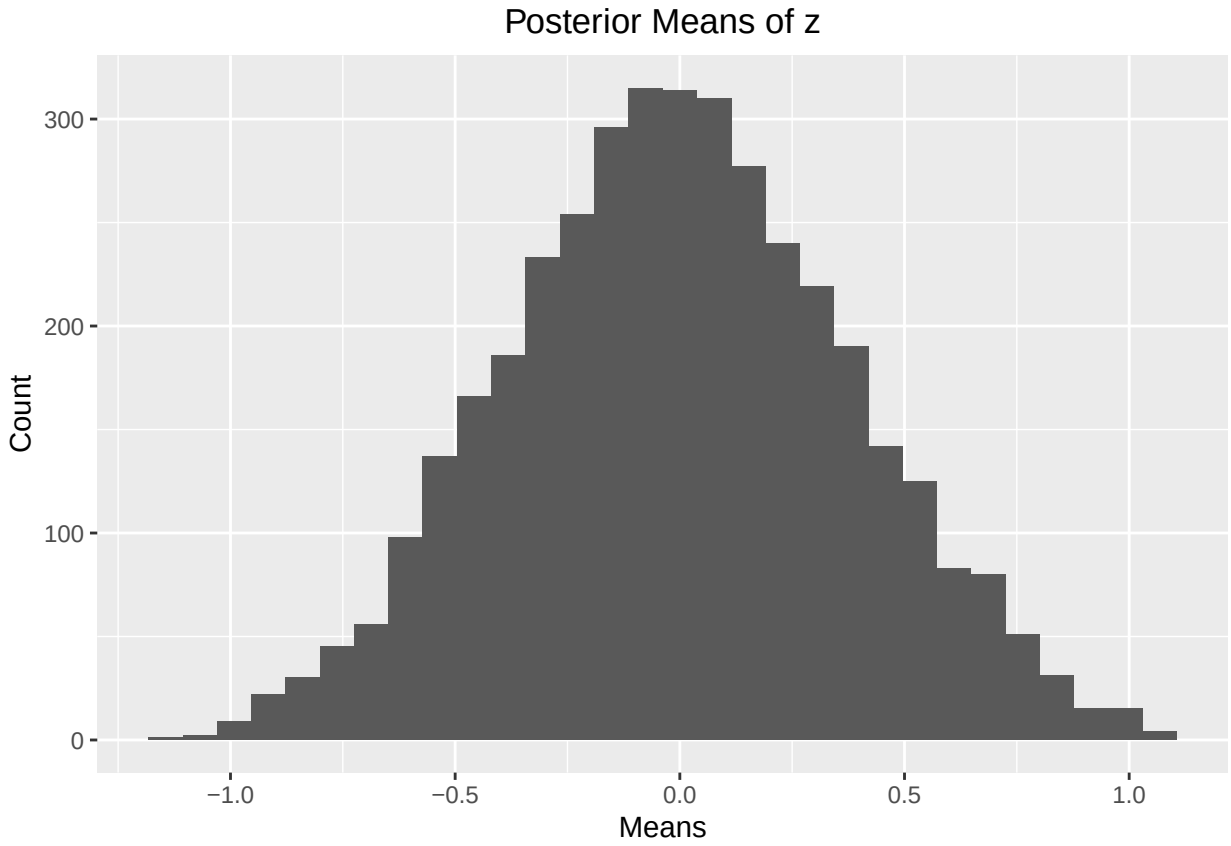
## No summary function supplied, defaulting to `mean_se()`
## No summary function supplied, defaulting to `mean_se()`
## No summary function supplied, defaulting to `mean_se()`
## No summary function supplied, defaulting to `mean_se()`
```

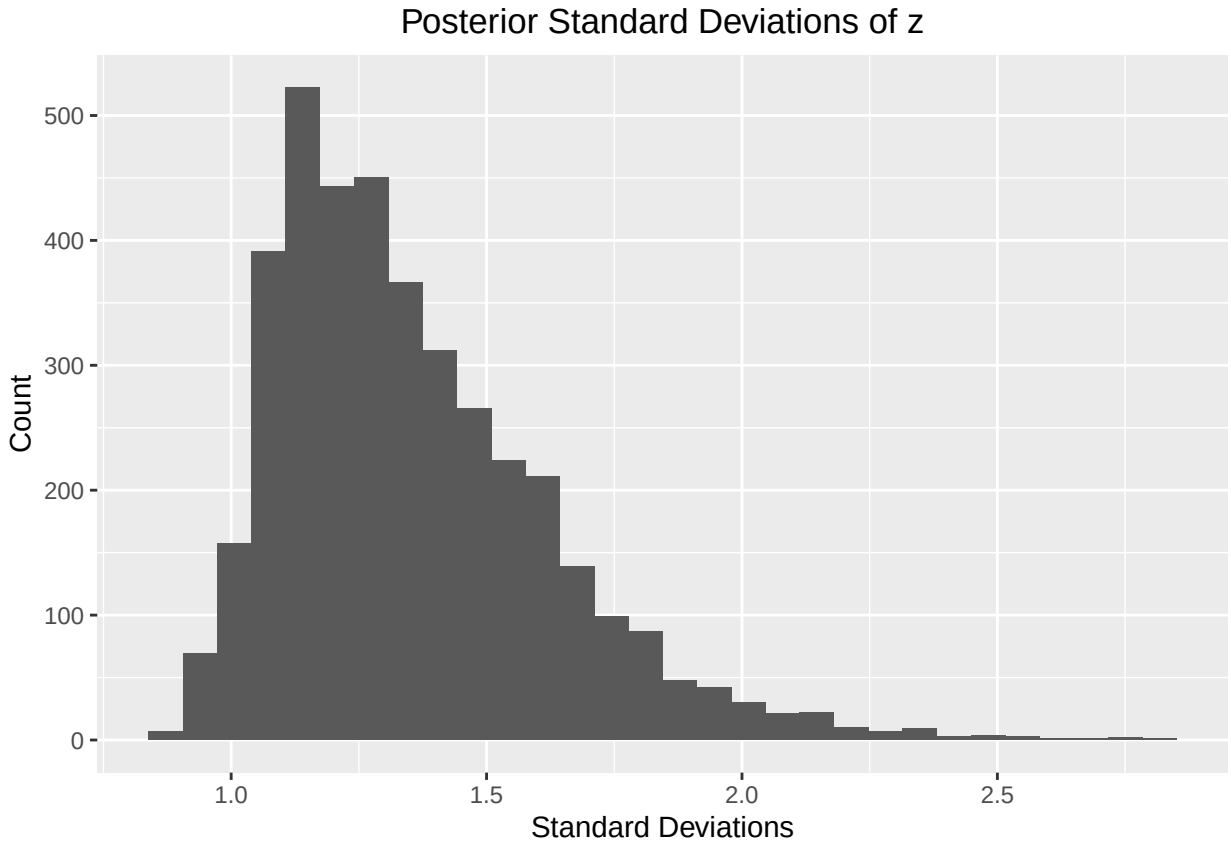

free_beta0[1]
free_beta0[2]
free_beta0[3]
free_beta0[4]
free_beta0[5]
free_beta0[6]
free_beta1
free_beta2
beta0[1]
beta0[2]
beta0[3]
beta0[4]
beta0[5]
beta0[6]
beta0[7]
beta1[1]
beta1[2]
beta1[3]
beta1[4]
beta1[5]
beta1[6]
beta1[7]
beta2[1]
beta2[2]
beta2[3]
beta2[4]
beta2[5]
beta2[6]
beta2[7]
Avg. autocorrelation
Lag
chain
1
2
3
4

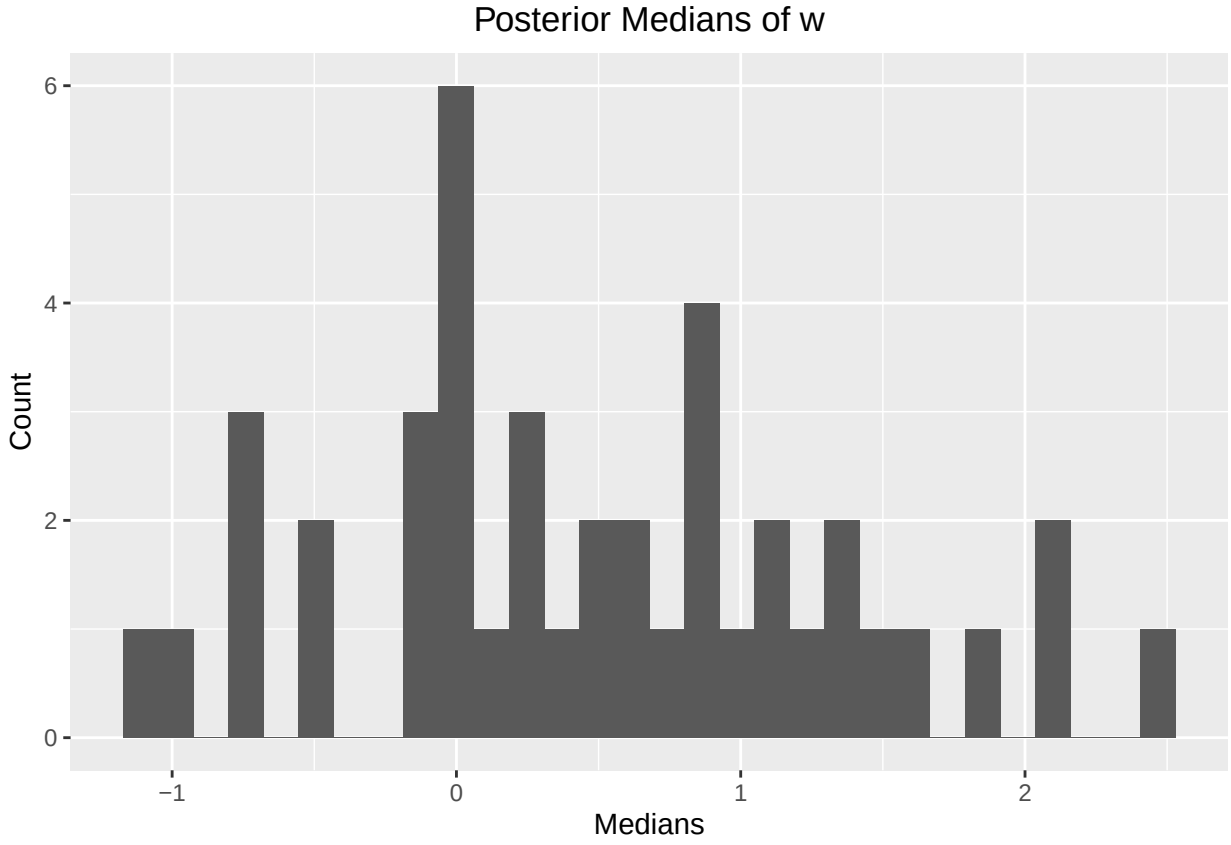



```
## [1] "       "
```

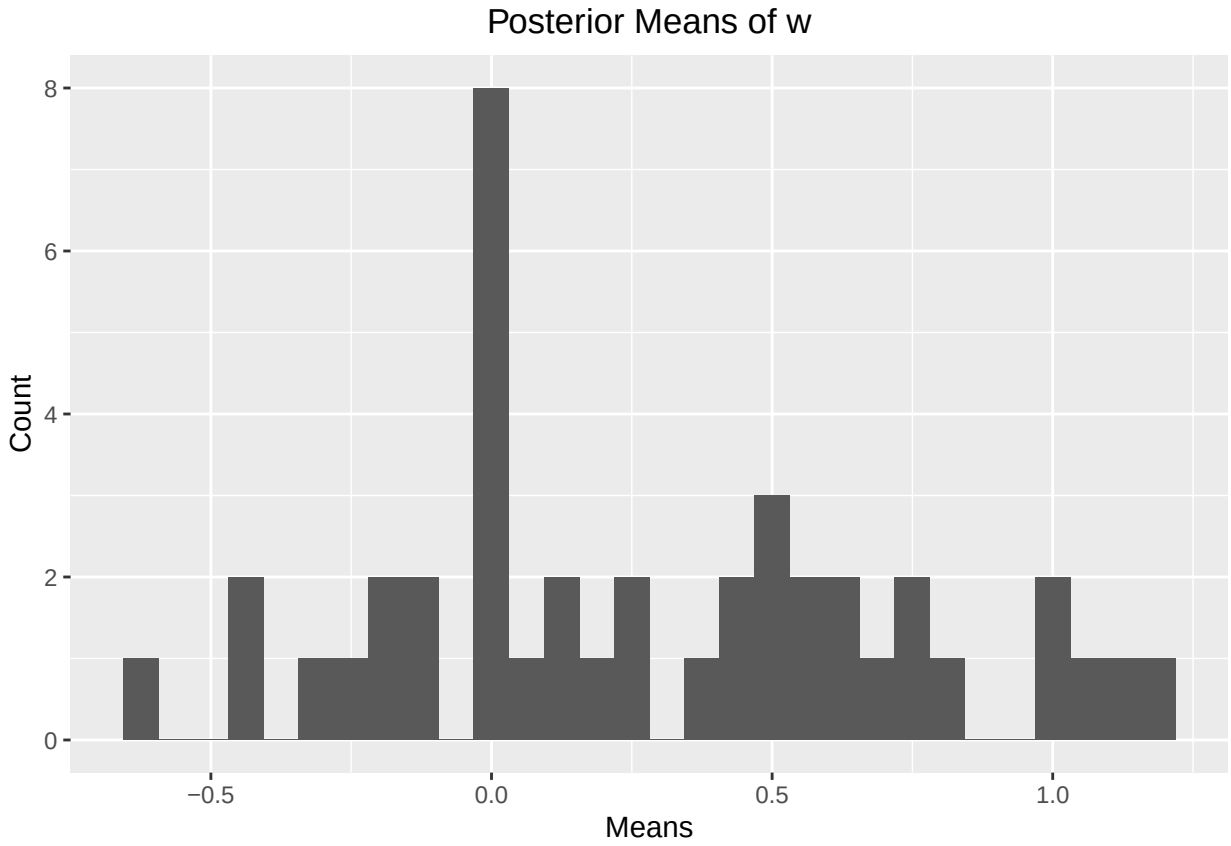



```
## [1] "      "
```

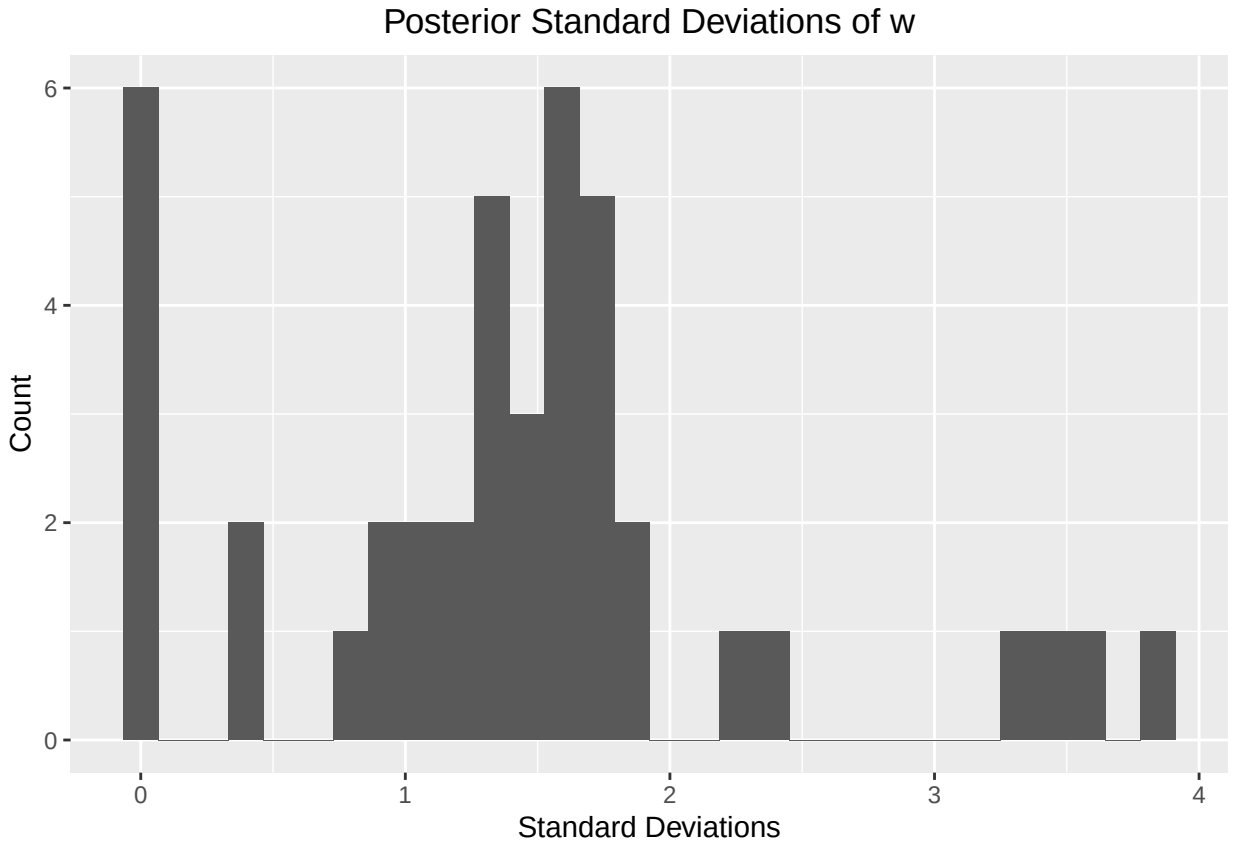

Posterior Standard Deviations of z
Count
500
400
300
200
100
0
1.0
1.5
2.0
2.5
Standard Deviations

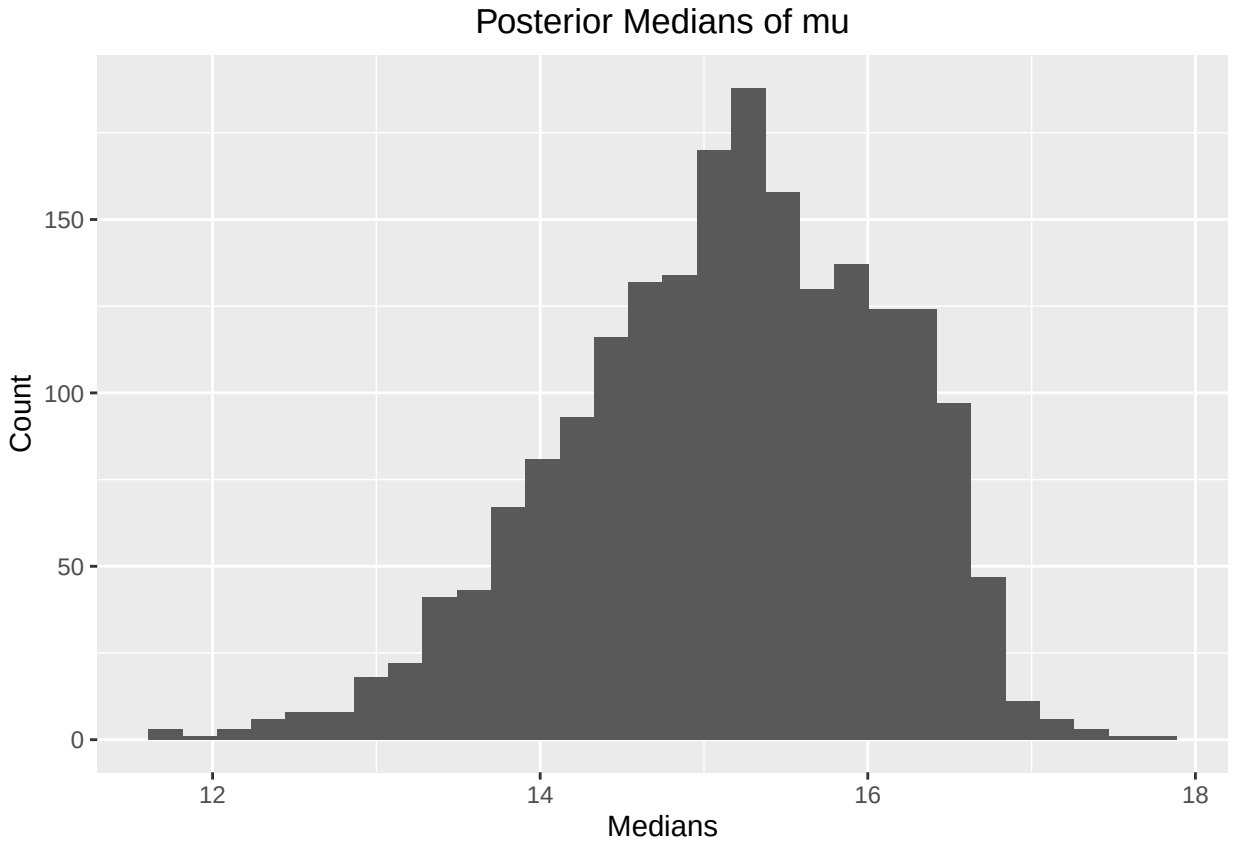

Posterior Medians of w
Count
6
4
2
0
−1
0
1
2
Medians

```
## [1] "       "
```

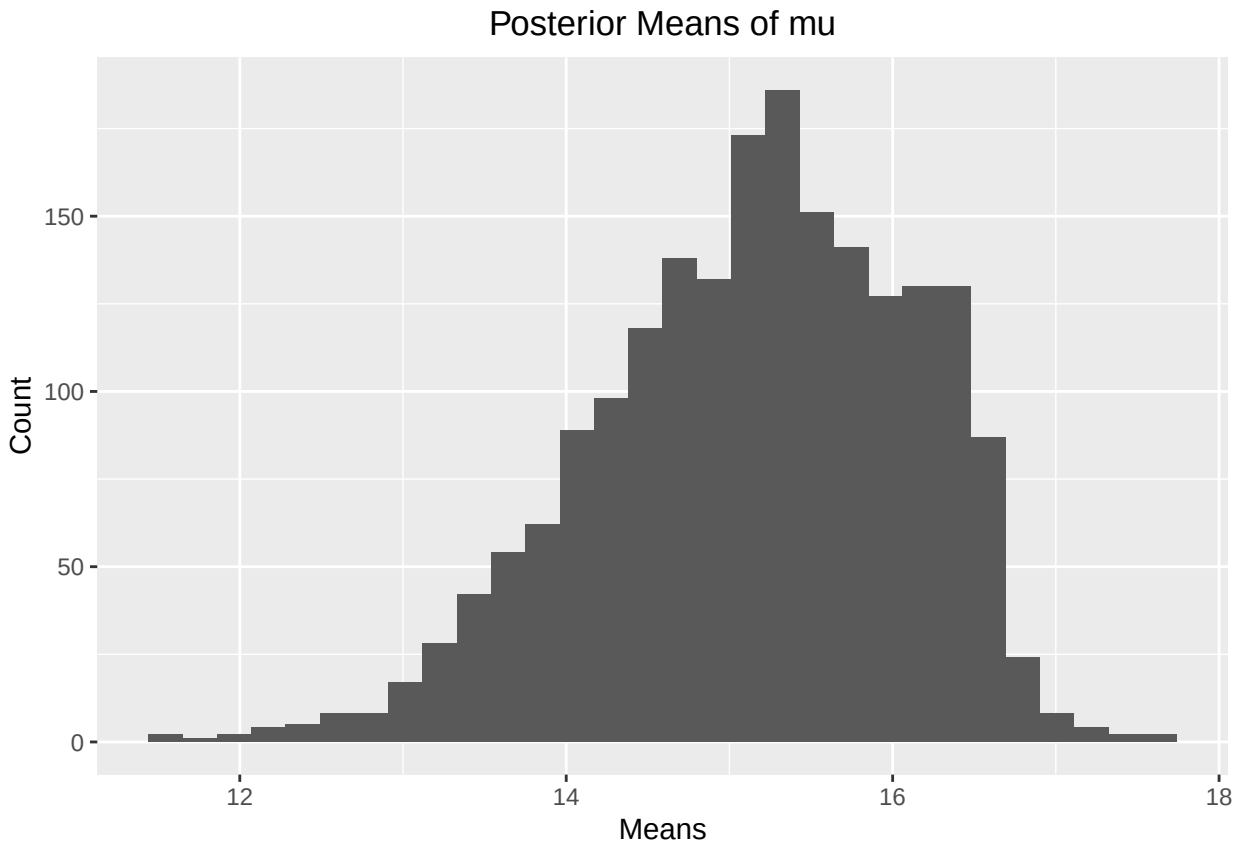



```
## [1] "      "
```

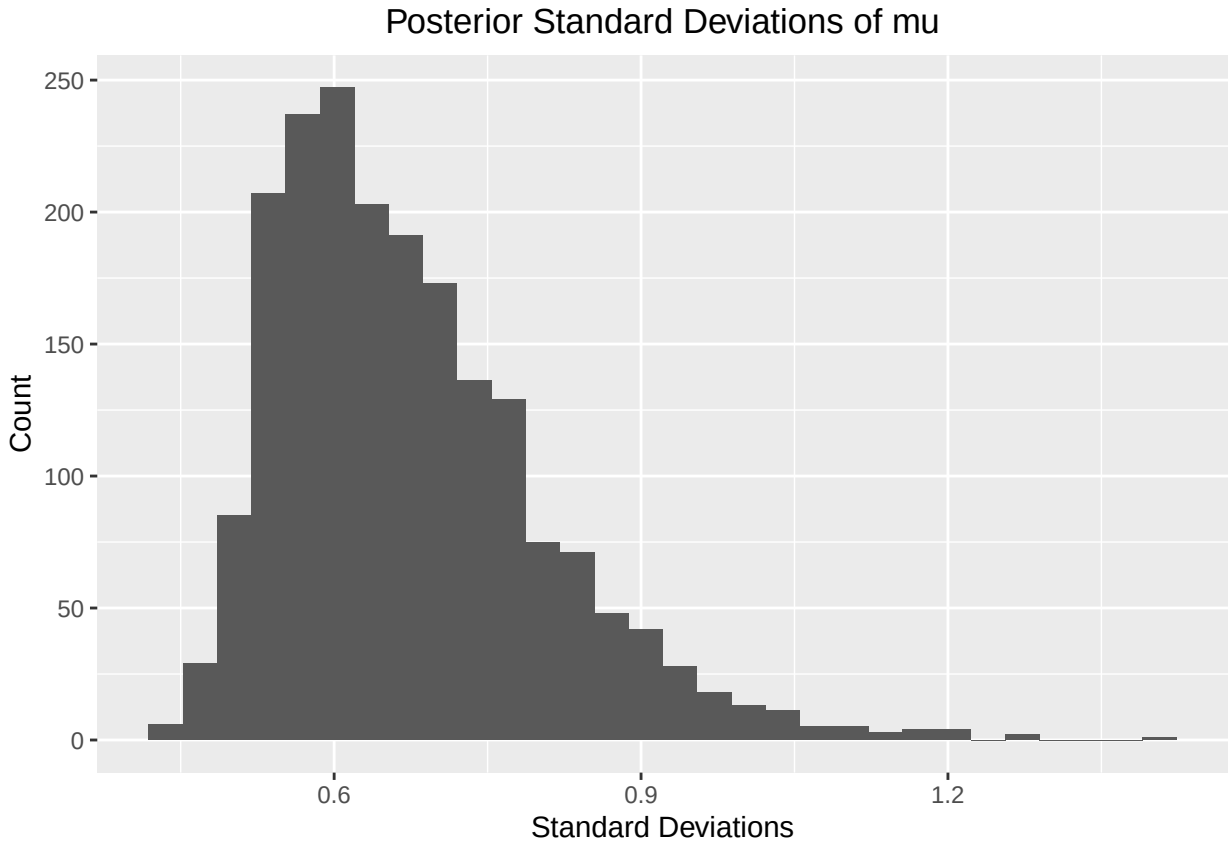

Posterior Standard Deviations of w
Count
Standard Deviations
0
1
2
3
4
0
2
4
6

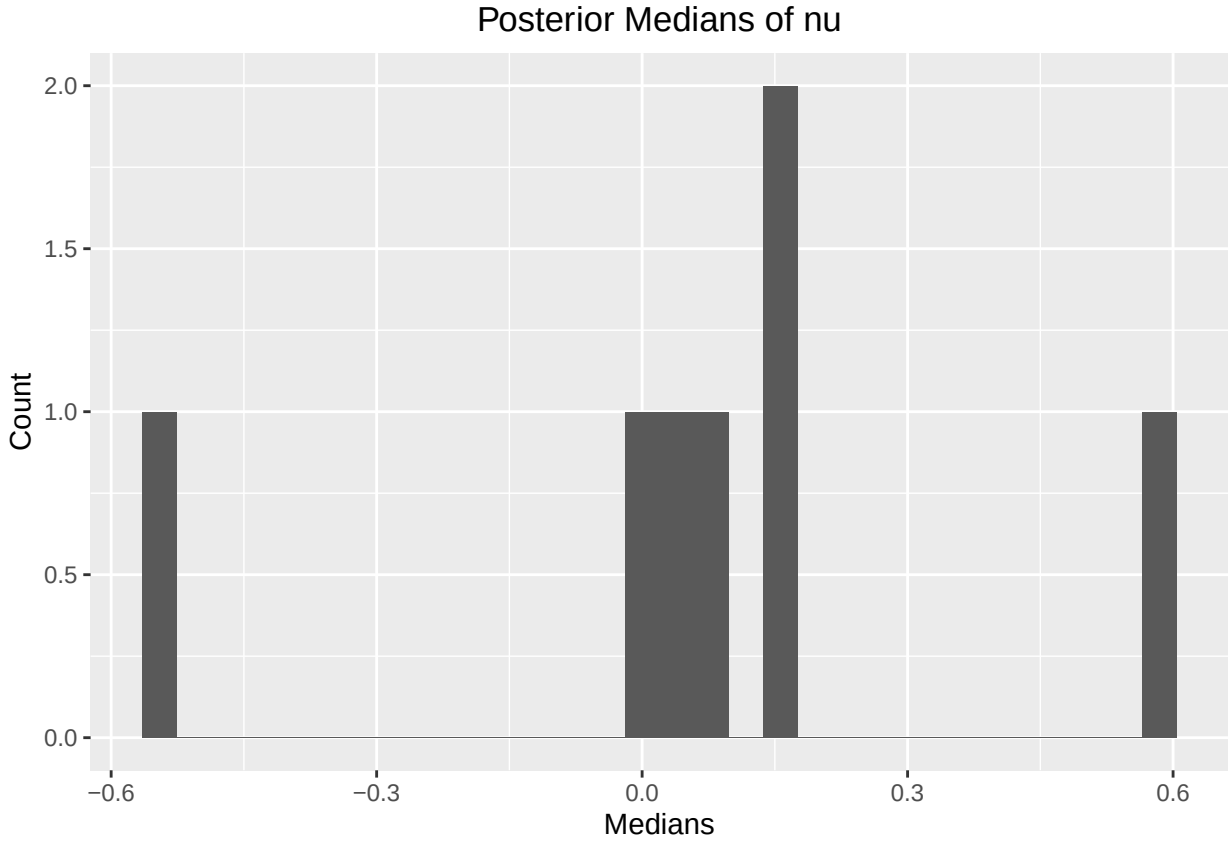

Posterior Medians of mu
Count
Medians
12
14
16
18
0
50
100
150

```
## [1] "       "
```

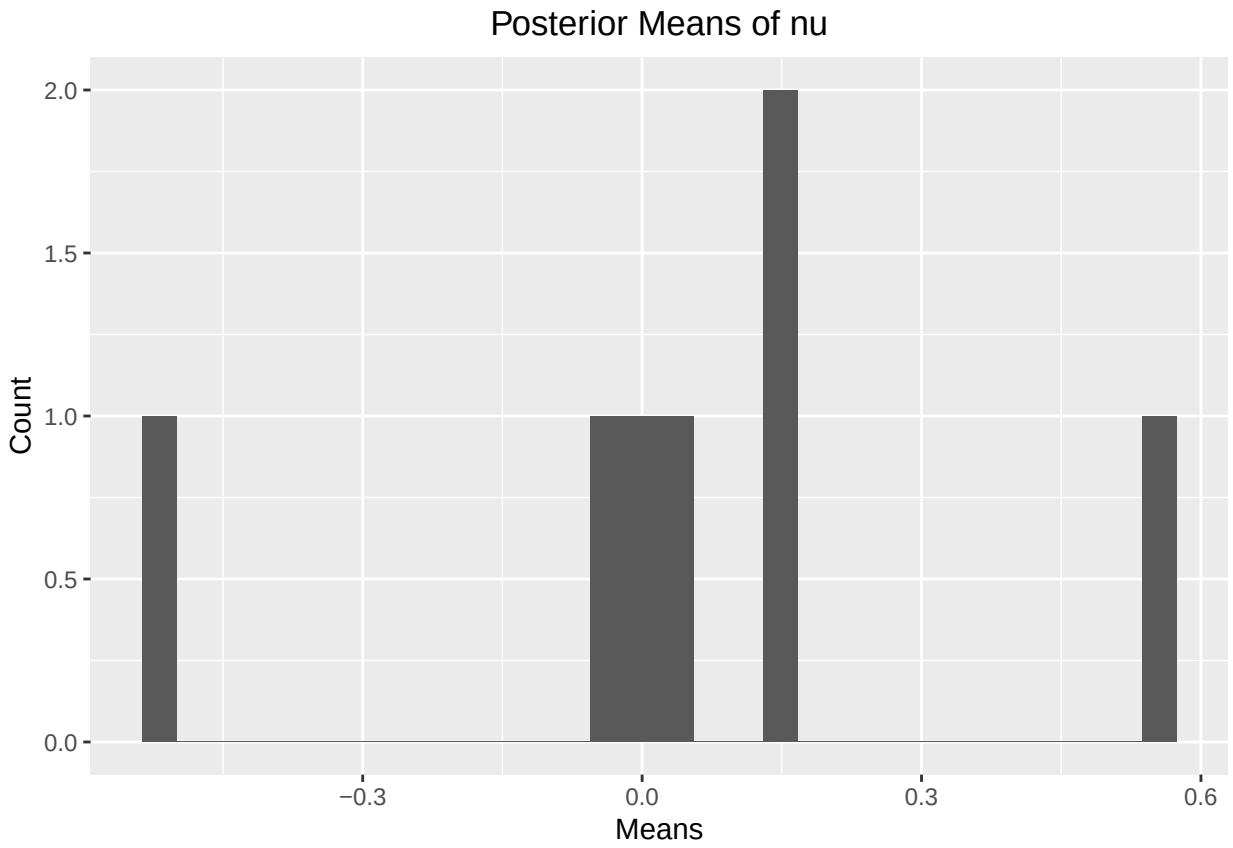



```
## [1] "      "
```

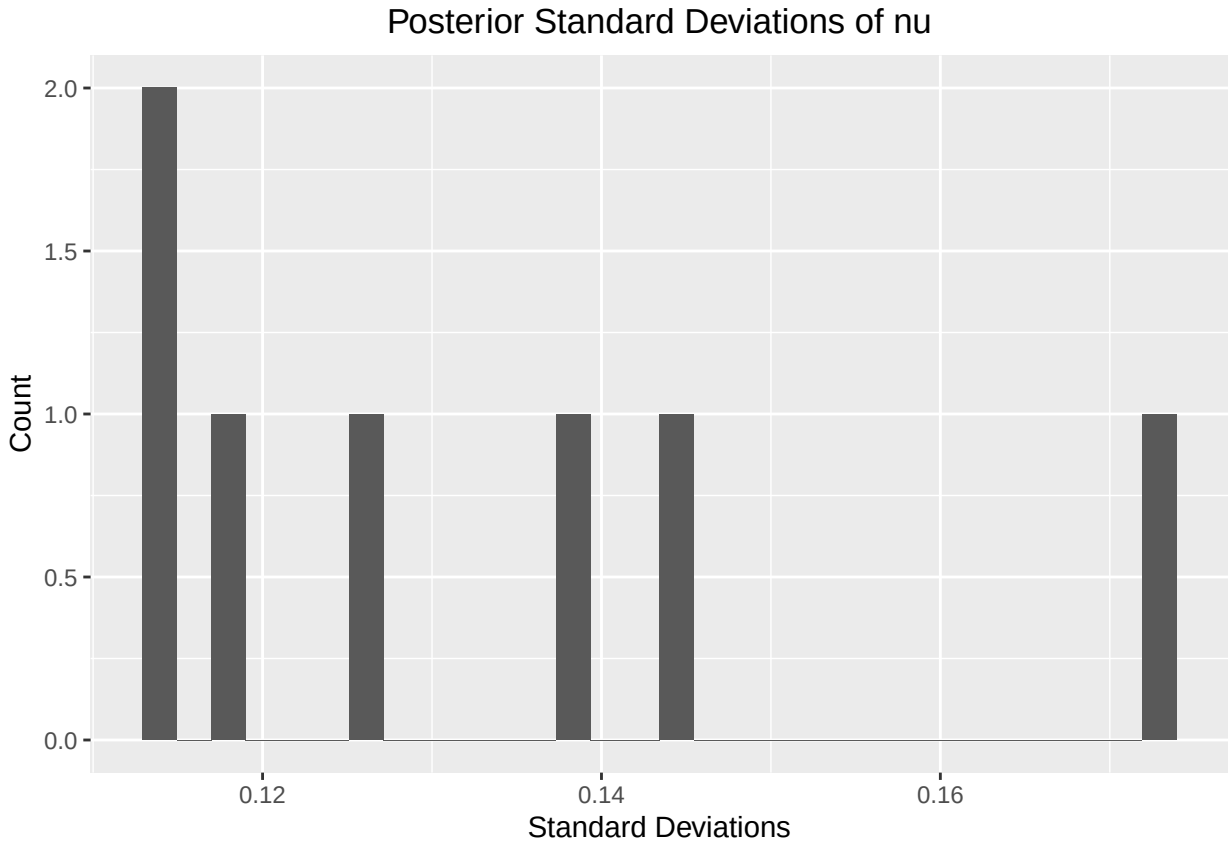

Posterior Standard Deviations of mu
Count
250
200
150
100
50
0
0.6
0.9
1.2
Standard Deviations

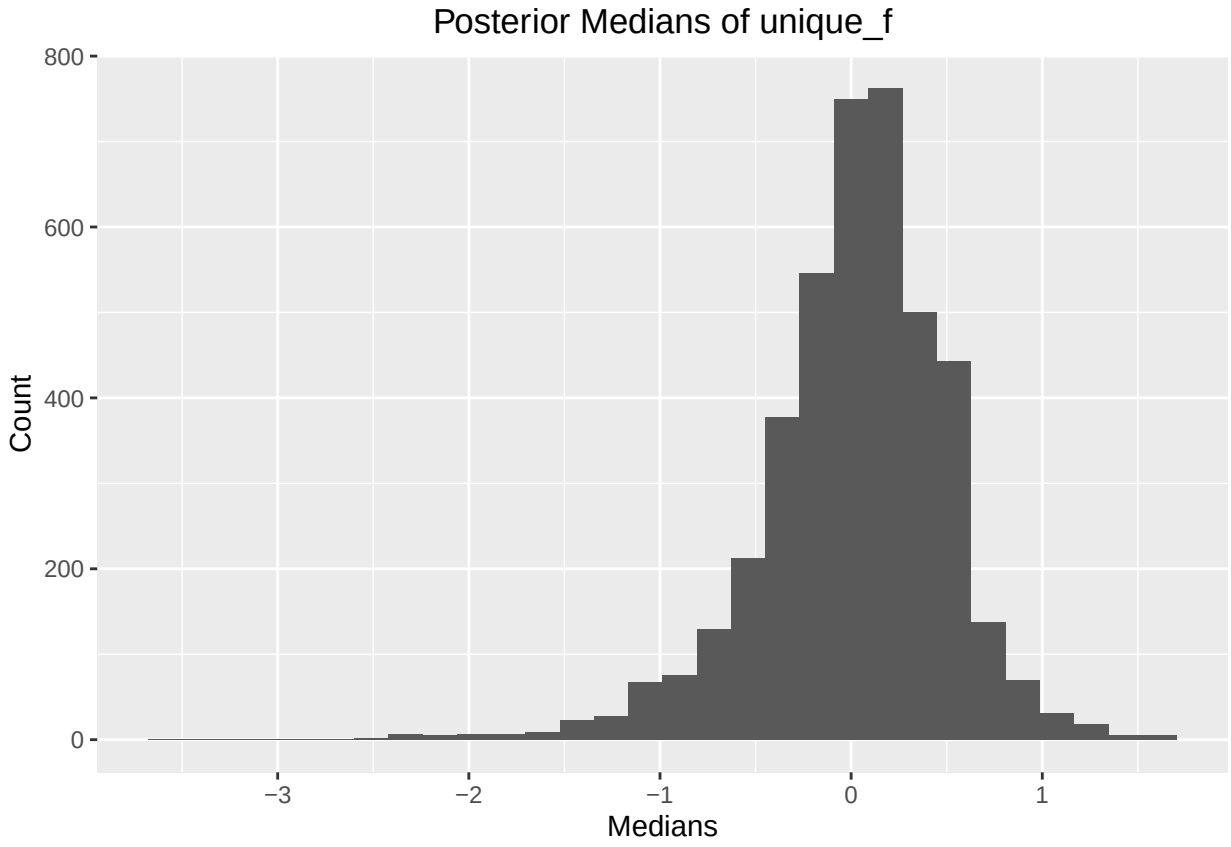

Posterior Medians of nu
Count
2.0
1.5
1.0
0.5
0.0
−0.6
−0.3
0.0
0.3
0.6
Medians

```
## [1] "       "
```

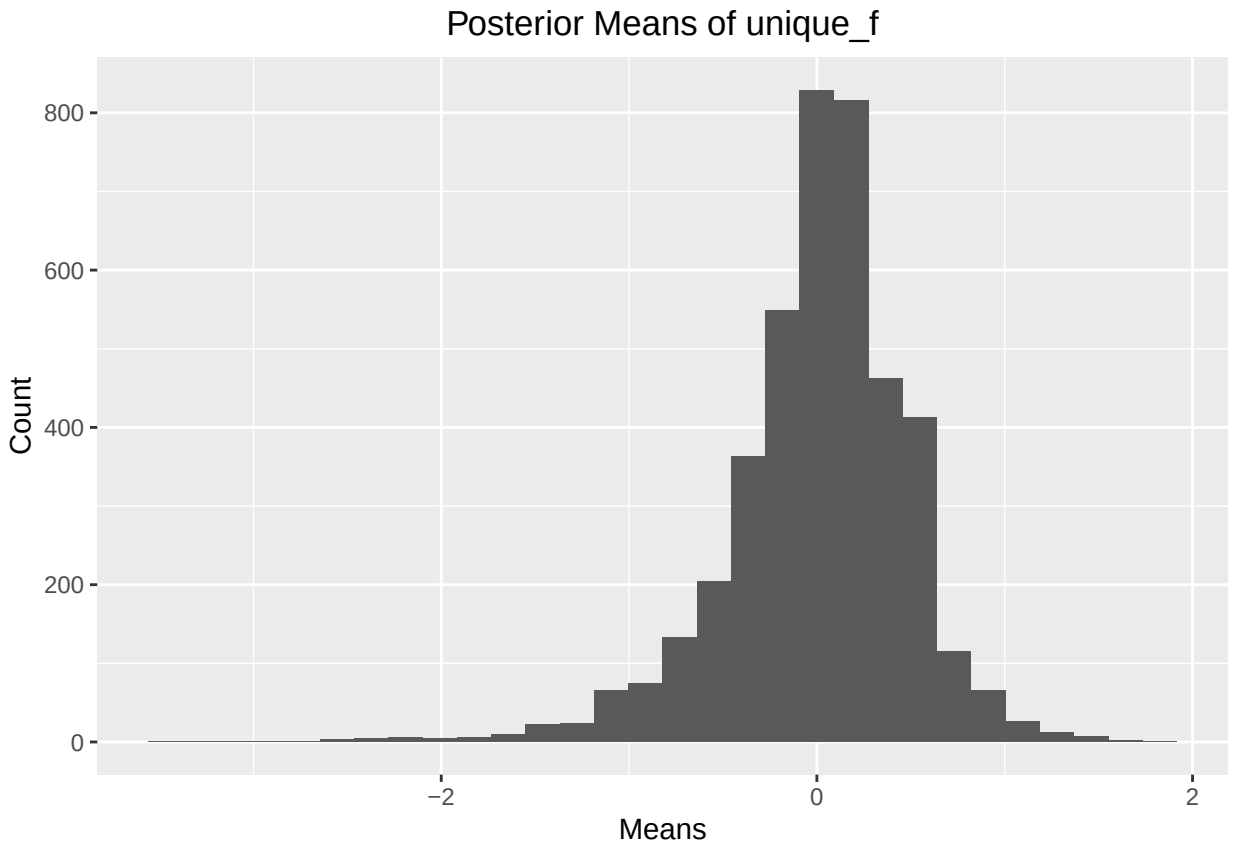



```
## [1] "      "
```

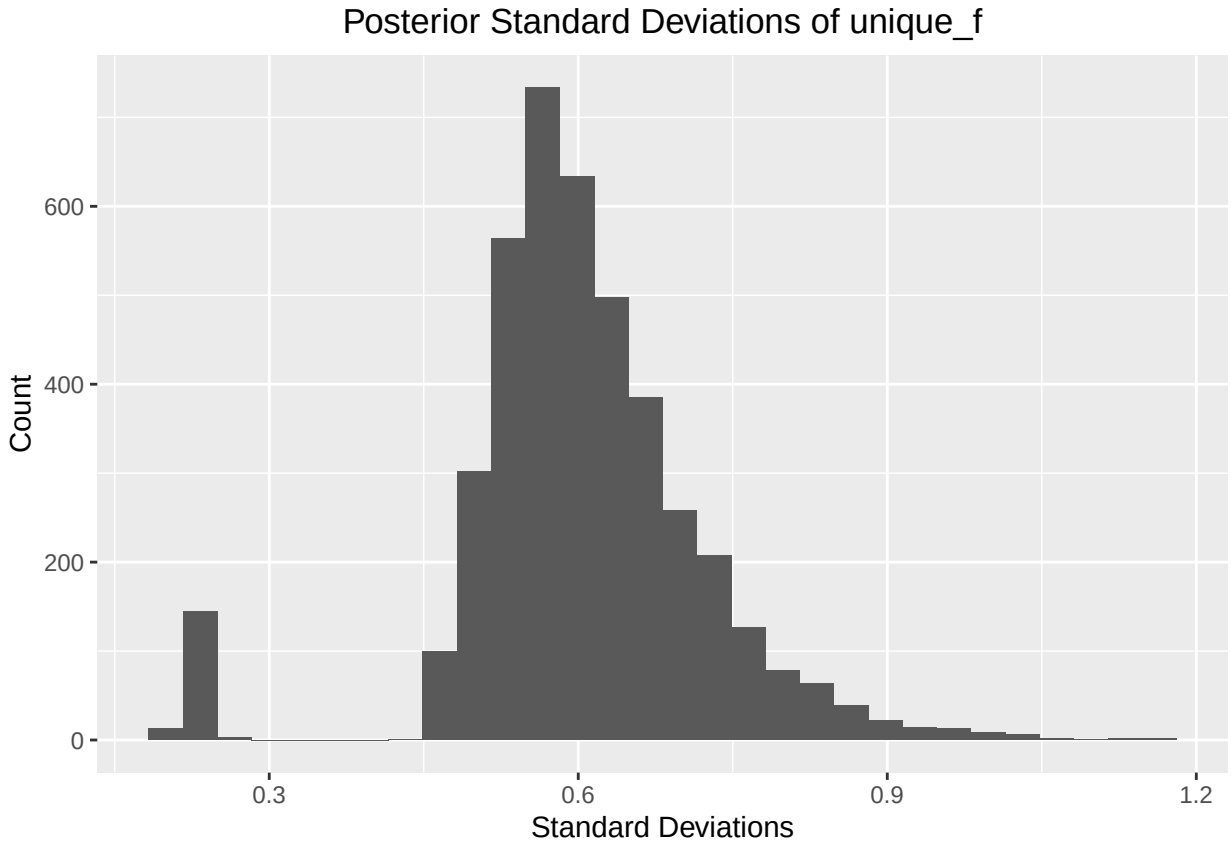

Posterior Standard Deviations of nu
Count
2.0
1.5
1.0
0.5
0.0
0.12
0.14
0.16
Standard Deviations

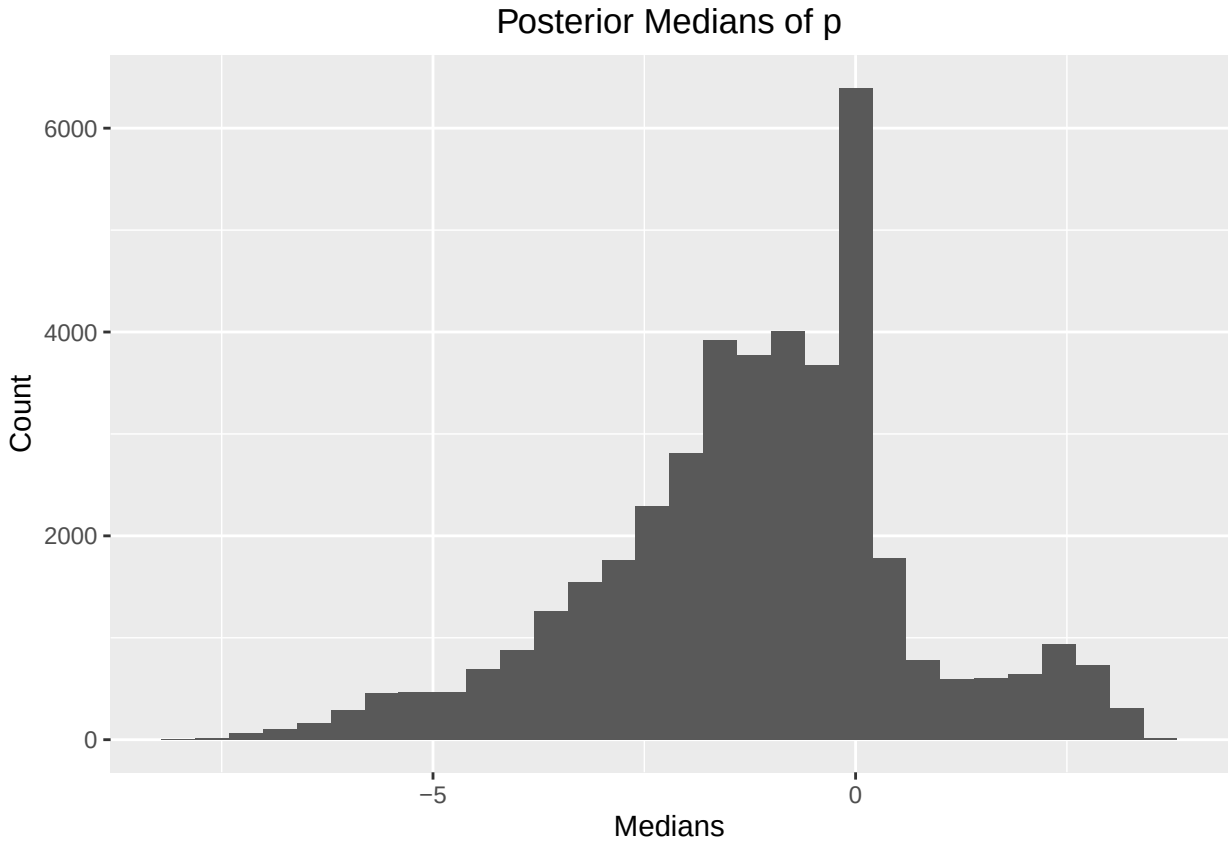

Posterior Medians of unique_f
Count
800
600
400
200
0
−3
−2
−1
0
1
Medians

```
## [1] "       "
```

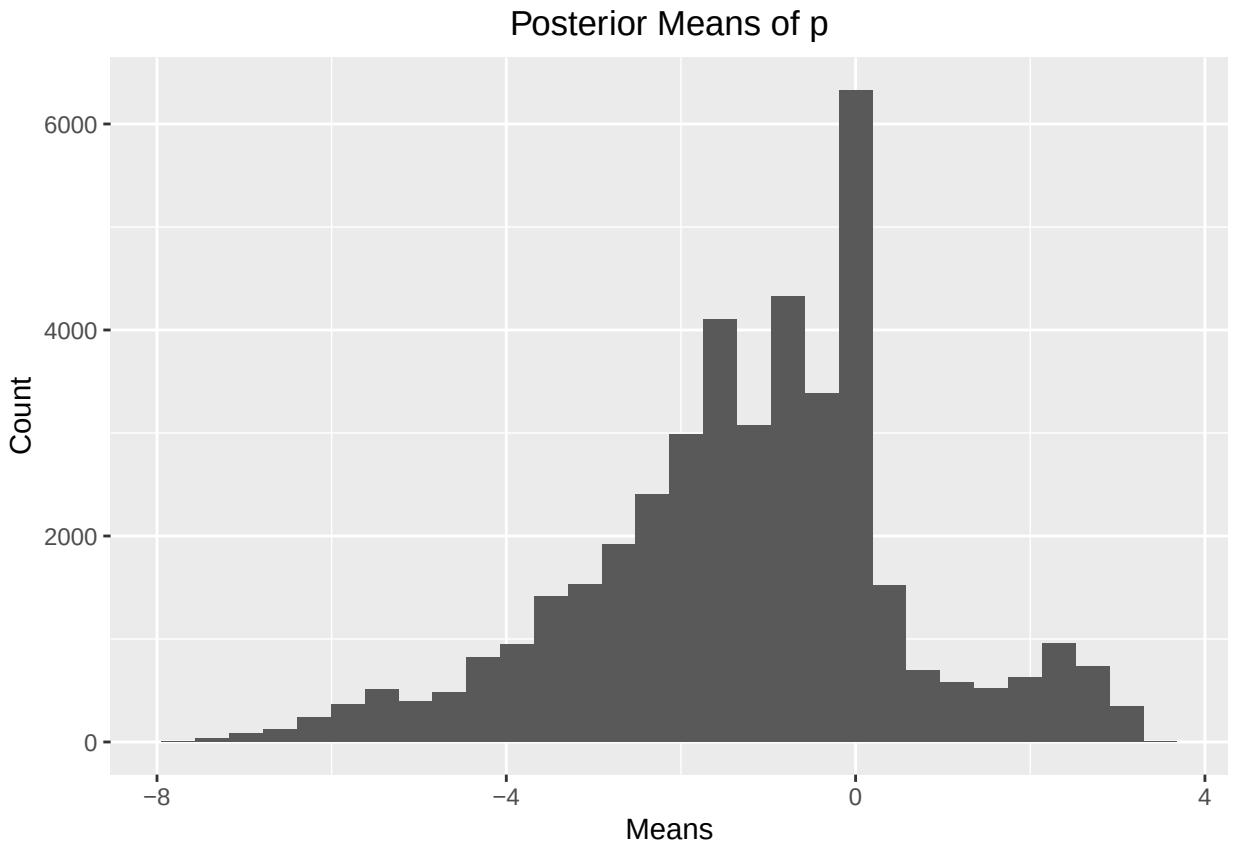



```
## [1] "      "
```

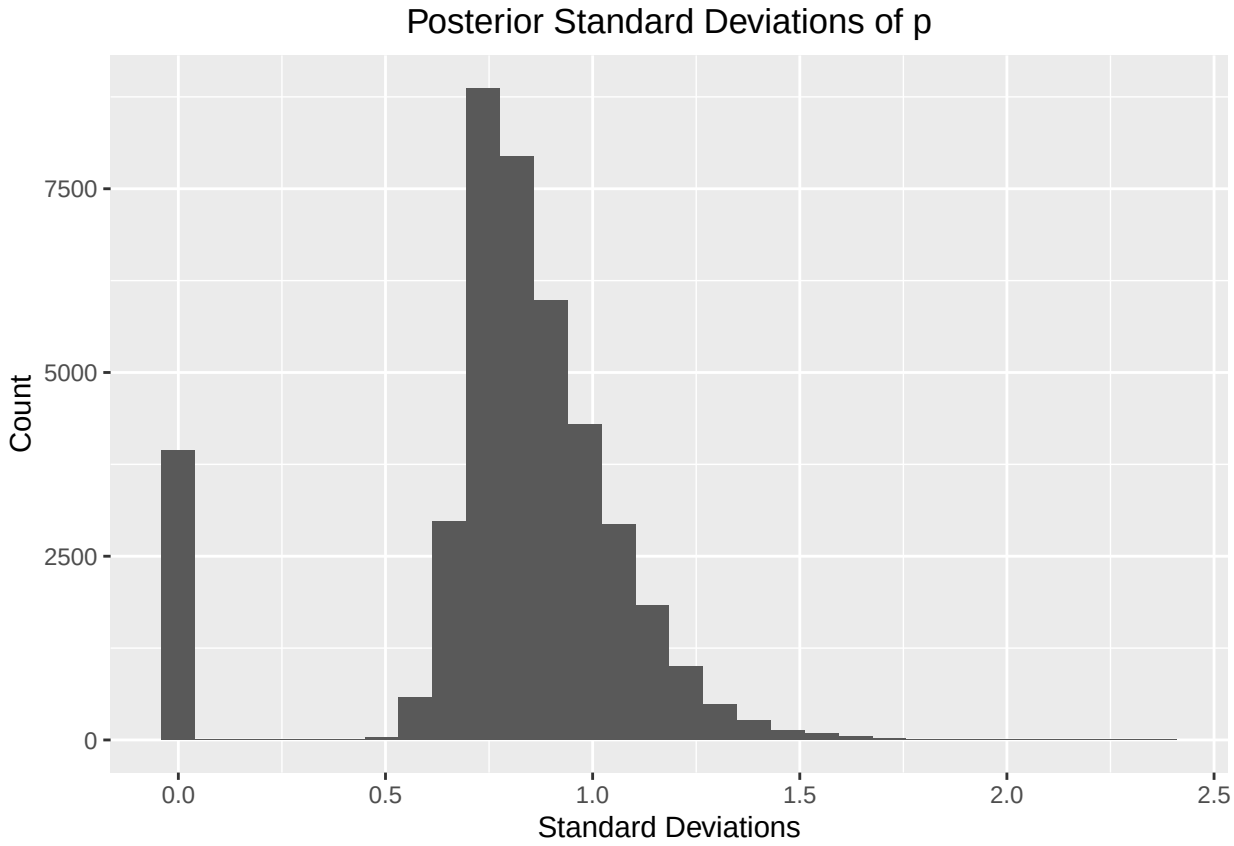

Posterior Standard Deviations of unique_f
Count
600
400
200
0
0.3
0.6
0.9
1.2
Standard Deviations


Posterior Medians of p
Count
6000
4000
2000
0
−5
0
Medians

```
## [1] "       "
```




```
## [1] "      "
```



Histograms for β values and w, and z posterior means across chains.