

Code:

```
data <- read_excel("~/Desktop/scientific research/studies/sex differences in the eyes test across countries/datasets/data - validation a - igor.xlsx")
```

```
summary(data)
head(data)
```

```
data$country <- as.factor(data$country)
data$sex_dichotomous <- as.factor(data$sex_dichotomous)
```

```
pr = prior(normal(0,1), class = "b")
```

```
outcome_v_a = brm(scale(eyes_test_total) ~ sex_dichotomous + age,
  data=data,
  prior = pr,
  cores = 6
)
```

```
summary(outcome_v_a)
conditional_effects(outcome_v_a)
```

-----

```
data_validation_b_igor
```

```
data_validation_b_igor$country <- as.factor(data_validation_b_igor$country)
data_validation_b_igor$sex_dichotomous <- as.factor(data_validation_b_igor$sex_dichotomous)
```

```
pr = prior(normal(0,1), class = "b")
```

```
outcome_v_b = brm(scale(eyes_test_score_first18) ~ sex_dichotomous + age,
  data= data_validation_b_igor,
  prior = pr,
  cores = 6
)
```

```
summary(outcome_v_b)
conditional_effects(outcome_v_b)
```

---

```
library(readxl)
data_validation_c <- read_excel("Desktop/scientific research/studies/sex differences in the eyes test across countries/datasets/data - validation c.xlsx")
View(data_validation_c)
```

```

summary(data_validation_c_igor)
head(data_validation_c_igor)

data_validation_c_igor$country <- as.factor(data_validation_c_igor $country)
data_validation_c_igor$sex_dichotomous <- as.factor(data_validation_c_igor $sex_dichotomous)

pr = prior(normal(0,1), class = "b")

outcome_v_c = brm(scale(eyes_test_total) ~ sex_dichotomous + age,
  data= data_validation_c_igor,
  prior = pr,
  cores = 6
)

summary(outcome_v_c)
conditional_effects(outcome_v_c)

---

library(readxl)
data_discovery_igor <- read_excel("Desktop/scientific research/studies/sex differences in the eyes test
across countries/datasets/data - discovery - igor.xlsx")
View(data_discovery_igor)

summary(data_validation_c_igor)
head(data_validation_c_igor)

data_discovery_igor_retry$country_now <- as.factor(data_discovery_igor_retry$country_now)
data_discovery_igor_retry $sex_dichotomous <- as.factor(data_discovery_igor_retry$sex_dichotomous)
data_discovery_igor_retry $age <- as.factor(data_discovery_igor_retry $age)

data$sex_dichotomous <- as.factor(data$sex_dichotomous)
data$country_now <- as.factor(data$country_now)
data$age <- as.factor(data$age)

pr = prior(normal(0,1), class = "b")

outcome_d = brm(scale(eyes_test_score) ~ sex_dichotomous + age +(1|country_now),
  data= data_discovery_igor,
  prior = pr,
  cores = 6
)

summary(outcome_d)

```

```
conditional_effects(outcome_d)
```

```
outcome_d = brm(scale(eyes_test_score) ~ sex_dichotomous + age + education + web_usage +  
comprehension + face_knowledge + (1|country_now),  
  data= data_discovery_igor,  
  prior = pr,  
  cores = 6  
)
```

```
summary(outcome_d)  
conditional_effects(outcome_d)
```

```
outcome_age_non_linear = brm(scale(eyes_test_score) ~ sex_dichotomous + age +  
sex_dichotomous_x_age + age_squared + (1|country_now),  
  data= data_discovery_igor,  
  prior = pr,  
  cores = 6  
)
```

```
summary(outcome_age_non_linear)  
conditional_effects(outcome_age_non_linear)
```

Code w/ Results:

R version 4.1.2 (2021-11-01) -- "Bird Hippie"  
Copyright (C) 2021 The R Foundation for Statistical Computing  
Platform: x86\_64-apple-darwin17.0 (64-bit)

R is free software and comes with ABSOLUTELY NO WARRANTY.  
You are welcome to redistribute it under certain conditions.  
Type 'license()' or 'licence()' for distribution details.

Natural language support but running in an English locale

R is a collaborative project with many contributors.  
Type 'contributors()' for more information and  
'citation()' on how to cite R or R packages in publications.

Type 'demo()' for some demos, 'help()' for on-line help, or  
'help.start()' for an HTML browser interface to help.  
Type 'q()' to quit R.

Warning: namespace 'DBI' is not available and has been replaced  
by .GlobalEnv when processing object 'outcome'  
Warning: namespace 'DBI' is not available and has been replaced  
by .GlobalEnv when processing object 'outcome'  
Warning: namespace 'DBI' is not available and has been replaced  
by .GlobalEnv when processing object 'outcome'  
Warning: namespace 'DBI' is not available and has been replaced  
by .GlobalEnv when processing object 'outcome'  
[Workspace loaded from ~/.RData]

```
> library(readxl)
> data_discovery_ <- read_excel("Desktop/scientific research/studies/sex differences in the eyes test
across countries/datasets/data - discovery - .xlsx")
> View(data_discovery_)
> library(readxl)
> data_discovery__retry <- read_excel("Desktop/scientific research/studies/sex differences in the eyes
test across countries/datasets/data - discovery - _retry.xlsx")
> View(data_discovery__retry)
> library(brm)
> library(brms)
Loading required package: Rcpp
Loading 'brms' package (version 2.16.3). Useful instructions
can be found by typing help('brms'). A more detailed introduction
to the package is available through vignette('brms_overview').
```

Attaching package: 'brms'

The following object is masked from 'package:brm':

brm

The following object is masked from 'package:stats':


ar

```
> data_discovery__retry$country_now <- as.factor(data_discovery__retry$country_now)
> data_discovery__retry $sex_dichotomous <- as.factor(data_discovery__retry$sex_dichotomous)
> data_discovery__retry $age <- as.factor(data_discovery_ $age)
Error: Assigned data `as.factor(data_discovery_$age)` must be compatible with existing data.
x Existing data has 289729 rows.
x Assigned data has 305726 rows.
i Only vectors of size 1 are recycled.
Run `rlang::last_error()` to see where the error occurred.
>
>
> > data_discovery__retry $age <- as.factor(data_discovery_$age)
Error: unexpected '>' in ">"
> data_discovery__retry$age <- as.factor(data_discovery_$age)
```

Error: Assigned data `as.factor(data\_discovery\_\$age)` must be compatible with existing data.

x Existing data has 289729 rows.

x Assigned data has 305726 rows.

 Only vectors of size 1 are recycled.

Run `rlang::last\_error()` to see where the error occurred.

```
> pr = prior(normal(0,1), class = "b")
```

```
> outcome_d = brm(scale(eyes_test_score) ~ sex_dichotomous + age +(1|country_now),
```

```
+       data= data_discovery__retry,
```

```
+       prior = pr,
```

```
+       cores = 6
```

```
+ )
```

Compiling Stan program...

Start sampling

starting worker pid=8670 on localhost:11238 at 14:57:15.213

starting worker pid=8684 on localhost:11238 at 14:57:15.489

starting worker pid=8698 on localhost:11238 at 14:57:15.726

starting worker pid=8712 on localhost:11238 at 14:57:15.974

SAMPLING FOR MODEL 'c473c9a39c7ce1d1a27625bf65598192' NOW (CHAIN 1).

Chain 1:

Chain 1: Gradient evaluation took 0.040057 seconds

Chain 1: 1000 transitions using 10 leapfrog steps per transition would take 400.57 seconds.

Chain 1: Adjust your expectations accordingly!

Chain 1:

Chain 1:

Chain 1: Iteration: 1 / 2000 [ 0%] (Warmup)

SAMPLING FOR MODEL 'c473c9a39c7ce1d1a27625bf65598192' NOW (CHAIN 2).

Chain 2:

Chain 2: Gradient evaluation took 0.051736 seconds

Chain 2: 1000 transitions using 10 leapfrog steps per transition would take 517.36 seconds.

Chain 2: Adjust your expectations accordingly!

Chain 2:

Chain 2:

Chain 2: Iteration: 1 / 2000 [ 0%] (Warmup)

SAMPLING FOR MODEL 'c473c9a39c7ce1d1a27625bf65598192' NOW (CHAIN 3).

Chain 3:

Chain 3: Gradient evaluation took 0.045665 seconds

Chain 3: 1000 transitions using 10 leapfrog steps per transition would take 456.65 seconds.

Chain 3: Adjust your expectations accordingly!

Chain 3:

Chain 3:

SAMPLING FOR MODEL 'c473c9a39c7ce1d1a27625bf65598192' NOW (CHAIN 4).

Chain 4:

Chain 4: Gradient evaluation took 0.066374 seconds

Chain 4: 1000 transitions using 10 leapfrog steps per transition would take 663.74 seconds.

Chain 4: Adjust your expectations accordingly!

Chain 4:

Chain 4:

Chain 3: Iteration: 1 / 2000 [ 0%] (Warmup)

Chain 4: Iteration: 1 / 2000 [ 0%] (Warmup)

Chain 3: Iteration: 200 / 2000 [ 10%] (Warmup)

Chain 4: Iteration: 200 / 2000 [ 10%] (Warmup)

Chain 2: Iteration: 200 / 2000 [ 10%] (Warmup)

Chain 1: Iteration: 200 / 2000 [ 10%] (Warmup)

Chain 2: Iteration: 400 / 2000 [ 20%] (Warmup)

Chain 3: Iteration: 400 / 2000 [ 20%] (Warmup)

Chain 4: Iteration: 400 / 2000 [ 20%] (Warmup)

Chain 1: Iteration: 400 / 2000 [ 20%] (Warmup)

Chain 3: Iteration: 600 / 2000 [ 30%] (Warmup)

Chain 2: Iteration: 600 / 2000 [ 30%] (Warmup)

Chain 4: Iteration: 600 / 2000 [ 30%] (Warmup)

Chain 1: Iteration: 600 / 2000 [ 30%] (Warmup)

Chain 3: Iteration: 800 / 2000 [ 40%] (Warmup)

Chain 2: Iteration: 800 / 2000 [ 40%] (Warmup)

Chain 4: Iteration: 800 / 2000 [ 40%] (Warmup)

Chain 1: Iteration: 800 / 2000 [ 40%] (Warmup)

Chain 3: Iteration: 1000 / 2000 [ 50%] (Warmup)

Chain 3: Iteration: 1001 / 2000 [ 50%] (Sampling)

Chain 2: Iteration: 1000 / 2000 [ 50%] (Warmup)

Chain 2: Iteration: 1001 / 2000 [ 50%] (Sampling)

Chain 4: Iteration: 1000 / 2000 [ 50%] (Warmup)

Chain 4: Iteration: 1001 / 2000 [ 50%] (Sampling)

Chain 1: Iteration: 1000 / 2000 [ 50%] (Warmup)

Chain 1: Iteration: 1001 / 2000 [ 50%] (Sampling)

Chain 3: Iteration: 1200 / 2000 [ 60%] (Sampling)

Chain 2: Iteration: 1200 / 2000 [ 60%] (Sampling)

Chain 4: Iteration: 1200 / 2000 [ 60%] (Sampling)

Chain 1: Iteration: 1200 / 2000 [ 60%] (Sampling)

Chain 3: Iteration: 1400 / 2000 [ 70%] (Sampling)

Chain 2: Iteration: 1400 / 2000 [ 70%] (Sampling)

Chain 4: Iteration: 1400 / 2000 [ 70%] (Sampling)

Chain 1: Iteration: 1400 / 2000 [ 70%] (Sampling)

Chain 3: Iteration: 1600 / 2000 [ 80%] (Sampling)

Chain 4: Iteration: 1600 / 2000 [ 80%] (Sampling)

Chain 2: Iteration: 1600 / 2000 [ 80%] (Sampling)

Chain 1: Iteration: 1600 / 2000 [ 80%] (Sampling)

Chain 3: Iteration: 1800 / 2000 [ 90%] (Sampling)

Chain 4: Iteration: 1800 / 2000 [ 90%] (Sampling)

Chain 2: Iteration: 1800 / 2000 [ 90%] (Sampling)

Chain 1: Iteration: 1800 / 2000 [ 90%] (Sampling)

Chain 3: Iteration: 2000 / 2000 [100%] (Sampling)

Chain 3:

Chain 3: Elapsed Time: 6074.77 seconds (Warm-up)

```

Chain 3:      2981.63 seconds (Sampling)
Chain 3:      9056.41 seconds (Total)
Chain 3:
Chain 4: Iteration: 2000 / 2000 [100%] (Sampling)
Chain 4:
Chain 4: Elapsed Time: 6141.52 seconds (Warm-up)
Chain 4:      2939.86 seconds (Sampling)
Chain 4:      9081.39 seconds (Total)
Chain 4:
Chain 1: Iteration: 2000 / 2000 [100%] (Sampling)
Chain 1:
Chain 1: Elapsed Time: 6339.63 seconds (Warm-up)
Chain 1:      2749.52 seconds (Sampling)
Chain 1:      9089.15 seconds (Total)
Chain 1:
Chain 2: Iteration: 2000 / 2000 [100%] (Sampling)
Chain 2:
Chain 2: Elapsed Time: 6118.68 seconds (Warm-up)
Chain 2:      2971.92 seconds (Sampling)
Chain 2:      9090.59 seconds (Total)
Chain 2:
Warning message:
Rows containing NAs were excluded from the model.
>
> summary(outcome_d)
Family: gaussian
Links: mu = identity; sigma = identity
Formula: scale(eyes_test_score) ~ sex_dichotomous + age + (1 | country_now)
Data: data_discovery__retry (Number of observations: 275613)
Draws: 4 chains, each with iter = 2000; warmup = 1000; thin = 1;
       total post-warmup draws = 4000

```

#### Group-Level Effects:

```

~country_now (Number of levels: 228)
      Estimate Est.Error l-95% CI u-95% CI Rhat Bulk_ESS Tail_ESS
sd(Intercept)  0.32    0.02  0.28  0.37 1.00   685    950

```

#### Population-Level Effects:

```

      Estimate Est.Error l-95% CI u-95% CI Rhat Bulk_ESS Tail_ESS
Intercept    -0.49    0.03  -0.54  -0.43 1.00   510    955
sex_dichotomous2  0.17    0.00  0.16  0.18 1.00  9292   2474
age           0.00    0.00  0.00  0.00 1.00  4231   2916

```

#### Family Specific Parameters:

```

      Estimate Est.Error l-95% CI u-95% CI Rhat Bulk_ESS Tail_ESS
sigma  0.98    0.00  0.98  0.99 1.00   3709   2468

```

Draws were sampled using sampling(NUTS). For each parameter, Bulk\_ESS

and Tail\_ESS are effective sample size measures, and Rhat is the potential scale reduction factor on split chains (at convergence, Rhat = 1).

```
> conditional_effects(outcome_d)
```

Hit <Return> to see next plot:

```
> outcome_d = brm(scale(eyes_test_score) ~ sex_dichotomous + factor(country_now),  
+ data= data_discovery__retry,  
+ prior = pr,  
+ cores = 6  
+ )
```

Compiling Stan program...

Start sampling

starting worker pid=10097 on localhost:11238 at 18:48:10.700

starting worker pid=10111 on localhost:11238 at 18:48:10.879

starting worker pid=10125 on localhost:11238 at 18:48:11.049

starting worker pid=10139 on localhost:11238 at 18:48:11.228

SAMPLING FOR MODEL 'a6836e7857cb1e8b5a40d3891eb390e1' NOW (CHAIN 1).

Chain 1:

Chain 1: Gradient evaluation took 0.06293 seconds

Chain 1: 1000 transitions using 10 leapfrog steps per transition would take 629.3 seconds.

Chain 1: Adjust your expectations accordingly!

Chain 1:

Chain 1:

Chain 1: Iteration: 1 / 2000 [ 0%] (Warmup)

SAMPLING FOR MODEL 'a6836e7857cb1e8b5a40d3891eb390e1' NOW (CHAIN 2).

Chain 2:

Chain 2: Gradient evaluation took 0.100906 seconds

Chain 2: 1000 transitions using 10 leapfrog steps per transition would take 1009.06 seconds.

Chain 2: Adjust your expectations accordingly!

Chain 2:

Chain 2:

Chain 2: Iteration: 1 / 2000 [ 0%] (Warmup)

SAMPLING FOR MODEL 'a6836e7857cb1e8b5a40d3891eb390e1' NOW (CHAIN 3).

Chain 3:

Chain 3: Gradient evaluation took 0.176433 seconds

Chain 3: 1000 transitions using 10 leapfrog steps per transition would take 1764.33 seconds.

Chain 3: Adjust your expectations accordingly!

Chain 3:

Chain 3:

Chain 3: Iteration: 1 / 2000 [ 0%] (Warmup)

SAMPLING FOR MODEL 'a6836e7857cb1e8b5a40d3891eb390e1' NOW (CHAIN 4).

Chain 4:

Chain 4: Gradient evaluation took 0.175756 seconds

Chain 4: 1000 transitions using 10 leapfrog steps per transition would take 1757.56 seconds.

Chain 4: Adjust your expectations accordingly!



Chain 4:

Chain 4:

Chain 4: Iteration: 1 / 2000 [ 0%] (Warmup)

Chain 2: Iteration: 200 / 2000 [ 10%] (Warmup)

Chain 4: Iteration: 200 / 2000 [ 10%] (Warmup)

Chain 3: Iteration: 200 / 2000 [ 10%] (Warmup)

Chain 1: Iteration: 200 / 2000 [ 10%] (Warmup)

Chain 4: Iteration: 400 / 2000 [ 20%] (Warmup)

Chain 2: Iteration: 400 / 2000 [ 20%] (Warmup)

Chain 3: Iteration: 400 / 2000 [ 20%] (Warmup)

Chain 1: Iteration: 400 / 2000 [ 20%] (Warmup)

Chain 4: Iteration: 600 / 2000 [ 30%] (Warmup)

Chain 2: Iteration: 600 / 2000 [ 30%] (Warmup)

Chain 3: Iteration: 600 / 2000 [ 30%] (Warmup)

Chain 1: Iteration: 600 / 2000 [ 30%] (Warmup)

Chain 3: Iteration: 800 / 2000 [ 40%] (Warmup)

Chain 2: Iteration: 800 / 2000 [ 40%] (Warmup)

Chain 4: Iteration: 800 / 2000 [ 40%] (Warmup)

Chain 1: Iteration: 800 / 2000 [ 40%] (Warmup)

Chain 3: Iteration: 1000 / 2000 [ 50%] (Warmup)

Chain 3: Iteration: 1001 / 2000 [ 50%] (Sampling)

Chain 2: Iteration: 1000 / 2000 [ 50%] (Warmup)

Chain 2: Iteration: 1001 / 2000 [ 50%] (Sampling)

Chain 4: Iteration: 1000 / 2000 [ 50%] (Warmup)

Chain 4: Iteration: 1001 / 2000 [ 50%] (Sampling)

Chain 1: Iteration: 1000 / 2000 [ 50%] (Warmup)

Chain 1: Iteration: 1001 / 2000 [ 50%] (Sampling)

Chain 3: Iteration: 1200 / 2000 [ 60%] (Sampling)

Chain 2: Iteration: 1200 / 2000 [ 60%] (Sampling)

Chain 4: Iteration: 1200 / 2000 [ 60%] (Sampling)

Chain 1: Iteration: 1200 / 2000 [ 60%] (Sampling)

Chain 3: Iteration: 1400 / 2000 [ 70%] (Sampling)

Chain 2: Iteration: 1400 / 2000 [ 70%] (Sampling)

Chain 4: Iteration: 1400 / 2000 [ 70%] (Sampling)

Chain 1: Iteration: 1400 / 2000 [ 70%] (Sampling)

Chain 3: Iteration: 1600 / 2000 [ 80%] (Sampling)

Chain 2: Iteration: 1600 / 2000 [ 80%] (Sampling)

Chain 4: Iteration: 1600 / 2000 [ 80%] (Sampling)

Chain 1: Iteration: 1600 / 2000 [ 80%] (Sampling)

Chain 3: Iteration: 1800 / 2000 [ 90%] (Sampling)

Chain 2: Iteration: 1800 / 2000 [ 90%] (Sampling)

Chain 4: Iteration: 1800 / 2000 [ 90%] (Sampling)

Chain 1: Iteration: 1800 / 2000 [ 90%] (Sampling)

Chain 3: Iteration: 2000 / 2000 [100%] (Sampling)

Chain 3:

Chain 3: Elapsed Time: 26598.3 seconds (Warm-up)

Chain 3: 11861.1 seconds (Sampling)

Chain 3: 38459.4 seconds (Total)

```

Chain 3:
Chain 2: Iteration: 2000 / 2000 [100%] (Sampling)
Chain 2:
Chain 2: Elapsed Time: 26999.6 seconds (Warm-up)
Chain 2:      11786.7 seconds (Sampling)
Chain 2:      38786.3 seconds (Total)
Chain 2:
Chain 4: Iteration: 2000 / 2000 [100%] (Sampling)
Chain 4:
Chain 4: Elapsed Time: 27481.3 seconds (Warm-up)
Chain 4:      11532.7 seconds (Sampling)
Chain 4:      39014 seconds (Total)
Chain 4:
Chain 1: Iteration: 2000 / 2000 [100%] (Sampling)
Chain 1:
Chain 1: Elapsed Time: 27760.7 seconds (Warm-up)
Chain 1:      11320.2 seconds (Sampling)
Chain 1:      39080.9 seconds (Total)
Chain 1:
Warning messages:
1: Rows containing NAs were excluded from the model.
2: The largest R-hat is 1.05, indicating chains have not mixed.
Running the chains for more iterations may help. See
https://mc-stan.org/misc/warnings.html#r-hat
3: Bulk Effective Samples Size (ESS) is too low, indicating posterior means and medians may be
unreliable.
Running the chains for more iterations may help. See
https://mc-stan.org/misc/warnings.html#bulk-ess
4: Tail Effective Samples Size (ESS) is too low, indicating posterior variances and tail quantiles may be
unreliable.
Running the chains for more iterations may help. See
https://mc-stan.org/misc/warnings.html#tail-ess
>
> summary(outcome_d)
Family: gaussian
Links: mu = identity; sigma = identity
Formula: scale(eyes_test_score) ~ sex_dichotomous + factor(country_now)
Data: data_discovery__retry (Number of observations: 283903)
Draws: 4 chains, each with iter = 2000; warmup = 1000; thin = 1;
      total post-warmup draws = 4000

```

#### Population-Level Effects:

	Estimate	Est.Error	l-95% CI	u-95% CI	Rhat	Bulk_ESS	Tail_ESS
Intercept	-0.54	0.06	-0.65	-0.44	1.05	69	326
sex_dichotomous2	0.17	0.00	0.16	0.18	1.00	7149	2899
factorcountry_now2	-0.16	0.16	-0.48	0.15	1.00	1201	2039
factorcountry_now3	-0.30	0.11	-0.52	-0.07	1.01	477	1495
factorcountry_now4	-0.50	0.16	-0.81	-0.19	1.01	1184	1917

factorcountry_now5	-0.40	0.15	-0.69	-0.12	1.01	775	2016
factorcountry_now6	-0.15	0.20	-0.54	0.25	1.00	1622	2004
factorcountry_now7	-0.43	0.19	-0.79	-0.05	1.00	1279	1784
factorcountry_now8	0.41	0.22	-0.03	0.84	1.00	2140	2802
factorcountry_now9	-0.47	0.21	-0.88	-0.06	1.00	1757	2257
factorcountry_now10	-0.04	0.18	-0.40	0.33	1.00	1361	2180
factorcountry_now11	-0.05	0.08	-0.21	0.12	1.02	200	766
factorcountry_now12	-0.82	0.15	-1.12	-0.51	1.01	904	2012
factorcountry_now13	-0.26	0.18	-0.61	0.09	1.01	1289	1588
factorcountry_now14	0.53	0.06	0.42	0.64	1.05	74	283
factorcountry_now15	0.05	0.08	-0.10	0.21	1.03	134	729
factorcountry_now16	0.04	0.15	-0.26	0.35	1.01	917	2237
factorcountry_now17	-0.13	0.12	-0.37	0.12	1.01	697	1672
factorcountry_now18	0.13	0.13	-0.12	0.37	1.01	707	1709
factorcountry_now19	-0.03	0.11	-0.24	0.18	1.01	506	1415
factorcountry_now20	0.34	0.13	0.09	0.59	1.01	563	1800
factorcountry_now21	0.81	0.28	0.25	1.38	1.00	3499	2761
factorcountry_now22	0.40	0.07	0.25	0.54	1.03	167	590
factorcountry_now23	-0.65	0.28	-1.22	-0.09	1.00	3737	2925
factorcountry_now25	0.59	0.20	0.20	0.99	1.00	2006	2116
factorcountry_now26	-1.19	0.73	-2.65	0.25	1.00	7821	2885
factorcountry_now27	0.54	0.25	0.07	1.02	1.00	3168	2799
factorcountry_now28	-0.29	0.13	-0.55	-0.03	1.01	713	1357
factorcountry_now29	-0.40	0.24	-0.87	0.06	1.00	2919	2750
factorcountry_now30	-0.26	0.71	-1.63	1.12	1.00	7816	2759
factorcountry_now31	-0.07	0.06	-0.19	0.05	1.04	95	400
factorcountry_now33	-0.34	0.44	-1.20	0.54	1.00	6580	2974
factorcountry_now34	0.20	0.16	-0.12	0.52	1.00	985	2174
factorcountry_now35	-0.06	0.10	-0.24	0.14	1.02	275	974
factorcountry_now36	0.13	0.34	-0.54	0.80	1.00	4298	2547
factorcountry_now37	-0.33	0.51	-1.31	0.67	1.00	6936	2912
factorcountry_now38	0.20	0.16	-0.12	0.52	1.01	951	1910
factorcountry_now39	0.24	0.33	-0.39	0.88	1.00	4895	2892
factorcountry_now40	0.49	0.06	0.38	0.60	1.05	69	328
factorcountry_now41	0.06	0.35	-0.62	0.74	1.00	5501	3057
factorcountry_now42	0.23	0.24	-0.25	0.70	1.00	3096	2151
factorcountry_now43	1.02	0.73	-0.43	2.49	1.00	6058	2991
factorcountry_now44	-0.00	0.99	-1.95	1.92	1.00	6844	2684
factorcountry_now45	0.01	0.08	-0.14	0.16	1.03	190	702
factorcountry_now46	0.22	0.07	0.08	0.35	1.04	132	534
factorcountry_now48	-0.16	0.72	-1.56	1.22	1.00	7411	2759
factorcountry_now49	0.10	0.10	-0.09	0.30	1.01	433	1111
factorcountry_now50	0.00	1.00	-1.95	1.98	1.00	8945	2893
factorcountry_now51	0.08	0.43	-0.76	0.94	1.00	6881	3050
factorcountry_now52	-0.06	0.50	-1.02	0.95	1.00	6495	2534
factorcountry_now53	-0.38	0.58	-1.51	0.76	1.00	6124	2863
factorcountry_now54	0.03	0.16	-0.28	0.33	1.01	985	1911
factorcountry_now55	0.41	0.70	-0.98	1.80	1.00	8565	2870

factorcountry_now57	0.54	0.69	-0.81	1.88	1.00	7364	3056
factorcountry_now58	0.19	0.09	0.01	0.37	1.02	307	764
factorcountry_now59	0.07	0.36	-0.64	0.75	1.00	4851	2906
factorcountry_now60	-0.08	0.14	-0.34	0.20	1.01	808	2022
factorcountry_now61	0.16	0.10	-0.02	0.35	1.02	301	1174
factorcountry_now62	-1.36	0.44	-2.23	-0.47	1.00	6453	3088
factorcountry_now63	0.30	0.07	0.16	0.44	1.03	162	586
factorcountry_now64	-0.58	0.44	-1.45	0.29	1.00	5374	2629
factorcountry_now65	-0.02	0.36	-0.73	0.68	1.00	6745	2091
factorcountry_now66	0.32	0.17	-0.01	0.65	1.01	1188	2540
factorcountry_now67	0.31	0.16	-0.03	0.62	1.01	942	2014
factorcountry_now68	0.26	0.10	0.06	0.45	1.02	356	1213
factorcountry_now69	-0.16	0.29	-0.75	0.41	1.00	3902	2257
factorcountry_now71	0.54	0.58	-0.58	1.67	1.00	7721	2967
factorcountry_now72	0.04	0.11	-0.18	0.27	1.01	574	1447
factorcountry_now73	0.08	0.22	-0.36	0.51	1.00	2695	2508
factorcountry_now75	0.24	0.57	-0.85	1.34	1.00	7771	2887
factorcountry_now76	-0.03	0.27	-0.56	0.50	1.00	3244	2471
factorcountry_now77	0.41	0.07	0.29	0.54	1.04	83	457
factorcountry_now78	0.30	0.07	0.18	0.43	1.04	88	474
factorcountry_now79	-0.08	0.56	-1.18	1.00	1.00	7132	3005
factorcountry_now80	-0.25	0.56	-1.32	0.84	1.00	6492	2869
factorcountry_now81	1.18	0.58	0.04	2.31	1.00	5157	2437
factorcountry_now82	0.69	0.58	-0.44	1.80	1.00	7914	2220
factorcountry_now83	-1.35	0.50	-2.35	-0.40	1.00	7093	2832
factorcountry_now84	-0.42	0.14	-0.68	-0.14	1.01	779	1835
factorcountry_now85	0.30	0.06	0.19	0.43	1.05	73	434
factorcountry_now86	0.06	0.20	-0.33	0.45	1.00	1864	2182
factorcountry_now87	0.20	0.29	-0.36	0.77	1.00	3062	2488
factorcountry_now88	0.13	0.08	-0.02	0.29	1.02	208	625
factorcountry_now89	-0.26	0.57	-1.36	0.85	1.00	6258	2510
factorcountry_now90	0.32	0.33	-0.33	0.97	1.00	4408	2961
factorcountry_now91	1.01	0.69	-0.28	2.34	1.00	7763	2770
factorcountry_now92	0.28	0.22	-0.14	0.71	1.00	2220	2757
factorcountry_now93	0.05	0.20	-0.35	0.44	1.00	1683	2769
factorcountry_now94	0.76	0.23	0.30	1.21	1.00	1867	2649
factorcountry_now97	0.46	0.28	-0.09	1.00	1.00	3674	2893
factorcountry_now98	0.35	0.37	-0.37	1.07	1.00	5263	2669
factorcountry_now99	-0.01	0.99	-1.89	1.91	1.00	7702	2981
factorcountry_now100	0.52	0.55	-0.57	1.63	1.00	7414	2881
factorcountry_now101	0.00	0.21	-0.42	0.43	1.00	1452	2655
factorcountry_now102	0.42	0.07	0.28	0.56	1.03	135	566
factorcountry_now103	-0.51	0.07	-0.64	-0.37	1.04	100	557
factorcountry_now104	0.33	0.13	0.07	0.58	1.01	588	1569
factorcountry_now106	0.03	0.06	-0.09	0.14	1.05	78	348
factorcountry_now107	-0.31	0.09	-0.47	-0.14	1.02	200	907
factorcountry_now109	-0.31	0.13	-0.56	-0.04	1.01	712	1786
factorcountry_now110	0.34	0.23	-0.13	0.80	1.00	2636	2585

factorcountry_now111	0.53	0.06	0.41	0.65	1.04	100	448
factorcountry_now112	0.39	0.19	0.02	0.76	1.00	1584	2191
factorcountry_now113	0.32	0.08	0.17	0.47	1.03	171	764
factorcountry_now114	0.18	0.07	0.04	0.32	1.03	158	588
factorcountry_now115	0.18	0.13	-0.08	0.43	1.01	567	1465
factorcountry_now116	0.36	0.07	0.22	0.50	1.04	142	532
factorcountry_now117	0.33	0.16	0.01	0.64	1.00	1184	2405
factorcountry_now118	0.09	0.13	-0.16	0.34	1.01	563	1680
factorcountry_now119	0.24	0.23	-0.21	0.67	1.00	2353	2707
factorcountry_now120	-0.11	0.10	-0.31	0.09	1.01	487	1067
factorcountry_now123	0.92	0.40	0.17	1.72	1.00	6837	3010
factorcountry_now124	0.22	0.57	-0.91	1.35	1.00	6592	2853
factorcountry_now125	0.45	0.08	0.29	0.60	1.02	209	821
factorcountry_now128	0.25	0.16	-0.07	0.56	1.01	1031	2416
factorcountry_now129	0.49	0.35	-0.19	1.18	1.00	5916	2588
factorcountry_now130	0.19	0.58	-0.95	1.31	1.00	7500	2701
factorcountry_now133	-0.03	0.17	-0.36	0.31	1.01	1006	1554
factorcountry_now134	0.19	0.13	-0.07	0.44	1.01	555	1794
factorcountry_now135	-1.89	0.58	-3.02	-0.76	1.00	7239	3040
factorcountry_now136	-0.26	0.36	-0.95	0.45	1.00	5078	2662
factorcountry_now137	-0.40	0.50	-1.38	0.60	1.00	6388	2798
factorcountry_now138	0.38	0.71	-0.99	1.79	1.00	7384	3079
factorcountry_now139	-0.54	0.09	-0.72	-0.35	1.02	203	1051
factorcountry_now140	0.34	0.21	-0.08	0.75	1.00	2128	2344
factorcountry_now141	-0.33	0.41	-1.12	0.48	1.00	6633	3031
factorcountry_now142	-0.36	0.21	-0.78	0.05	1.00	2446	2488
factorcountry_now143	-1.31	0.07	-1.44	-1.17	1.04	109	500
factorcountry_now144	-0.13	0.37	-0.83	0.59	1.00	4762	2899
factorcountry_now145	0.16	0.30	-0.42	0.76	1.00	3556	2787
factorcountry_now146	0.19	0.07	0.06	0.32	1.04	102	532
factorcountry_now147	-0.19	0.32	-0.82	0.44	1.00	5672	2697
factorcountry_now148	0.51	0.46	-0.38	1.42	1.00	6237	2573
factorcountry_now149	0.32	0.13	0.06	0.58	1.01	705	1233
factorcountry_now151	0.50	0.58	-0.66	1.66	1.00	8923	2774
factorcountry_now153	0.49	0.19	0.12	0.86	1.00	1409	2542
factorcountry_now155	0.04	0.08	-0.11	0.19	1.03	191	701
factorcountry_now157	0.45	0.56	-0.67	1.53	1.00	6199	2560
factorcountry_now158	-0.33	0.32	-0.94	0.32	1.00	4811	3126
factorcountry_now159	0.42	0.45	-0.46	1.29	1.00	6225	2648
factorcountry_now160	-0.23	0.27	-0.77	0.29	1.00	3790	2697
factorcountry_now161	-0.48	0.32	-1.09	0.14	1.00	5360	2448

[ reached getOption("max.print") -- omitted 92 rows ]

#### Family Specific Parameters:

	Estimate	Est.Error	l-95% CI	u-95% CI	Rhat	Bulk_ESS	Tail_ESS
sigma	0.98	0.00	0.98	0.99	1.00	3686	2453

Draws were sampled using sampling(NUTS). For each parameter, Bulk\_ESS

and Tail\_ESS are effective sample size measures, and Rhat is the potential scale reduction factor on split chains (at convergence, Rhat = 1).

Warning message:

Parts of the model have not converged (some Rhats are > 1.05). Be careful when analysing the results!  
We recommend running more iterations and/or setting stronger priors.

>

---

FROM KAGGLE

Warning message:

"Rows containing NAs were excluded from the model."

Compiling Stan program...

Start sampling

Family: gaussian

Links: mu = identity; sigma = identity

Formula: scale(eyes\_test\_score) ~ age + sex\_dichotomous + (1 | country\_now)

Data: us\_data (Number of observations: 1827)

Samples: 4 chains, each with iter = 3000; warmup = 1500; thin = 1;

total post-warmup samples = 6000

Group-Level Effects:

~country\_now (Number of levels: 79)

	Estimate	Est.Error	l-95% CI	u-95% CI	Rhat	Bulk_ESS	Tail_ESS
sd(Intercept)	0.61	0.13	0.37	0.89	1.00	1512	2610

Population-Level Effects:

	Estimate	Est.Error	l-95% CI	u-95% CI	Rhat	Bulk_ESS	Tail_ESS
Intercept	-0.65	0.14	-0.93	-0.38	1.00	1280	1856
age17	-0.04	0.14	-0.32	0.24	1.00	1691	2928
age18	0.07	0.14	-0.21	0.35	1.00	1618	2884
age19	0.18	0.14	-0.09	0.45	1.00	1696	2976
age20	0.27	0.14	-0.01	0.54	1.00	1620	2584
age21	0.18	0.14	-0.08	0.45	1.00	1481	2690
age22	0.14	0.15	-0.14	0.43	1.00	1768	2471
age23	0.37	0.14	0.09	0.65	1.00	1594	2652
age24	0.46	0.14	0.19	0.74	1.00	1684	2725
age25	0.40	0.15	0.12	0.69	1.00	1796	2774
age26	0.47	0.15	0.18	0.78	1.00	1867	2989
age27	0.28	0.15	-0.01	0.57	1.00	1844	2754
age28	0.24	0.15	-0.06	0.53	1.00	1842	3239
age29	0.17	0.16	-0.16	0.49	1.00	2113	3340
age30	0.46	0.16	0.16	0.77	1.00	2018	3341
age31	0.16	0.16	-0.16	0.48	1.00	2155	3521
age32	0.06	0.17	-0.28	0.39	1.00	2239	3319
age33	0.49	0.18	0.13	0.86	1.00	2757	3382

age34	0.26	0.19	-0.11	0.63	1.00	2557	3224
age35	0.42	0.18	0.07	0.77	1.00	2662	3299
age36	0.35	0.20	-0.05	0.74	1.00	3027	3878
age37	0.08	0.21	-0.33	0.48	1.00	3274	4155
age38	0.05	0.21	-0.36	0.46	1.00	3288	3848
age39	0.51	0.18	0.16	0.88	1.00	2690	3222
age40	0.61	0.21	0.20	1.03	1.00	3315	3673
age41	0.29	0.21	-0.12	0.69	1.00	3179	3990
age42	0.12	0.22	-0.30	0.54	1.00	4030	4065
age43	-0.06	0.26	-0.56	0.44	1.00	4101	3744
age44	-0.07	0.24	-0.54	0.40	1.00	4135	3792
age45	0.55	0.24	0.07	1.02	1.00	4412	3703
age46	0.45	0.24	-0.02	0.93	1.00	3994	3697
age47	0.49	0.22	0.08	0.93	1.00	3496	3516
age48	0.69	0.23	0.23	1.14	1.00	3869	3635
age49	0.23	0.27	-0.29	0.77	1.00	4815	4060
age50	0.04	0.25	-0.46	0.51	1.00	3759	3667
age51	0.59	0.30	-0.02	1.19	1.00	5652	4006
age52	0.03	0.29	-0.55	0.59	1.00	5260	4234
age53	0.31	0.31	-0.29	0.92	1.00	5748	4273
age54	0.08	0.35	-0.61	0.75	1.00	6347	4153
age55	0.19	0.29	-0.38	0.75	1.00	5129	3704
age56	-0.40	0.32	-1.03	0.26	1.00	6406	4167
age57	0.44	0.25	-0.06	0.94	1.00	4233	3637
age58	-0.01	0.33	-0.66	0.64	1.00	6300	4221
age59	-0.45	0.30	-1.04	0.15	1.00	6091	4179
age60	0.25	0.49	-0.69	1.18	1.00	9990	4278
age61	0.40	0.44	-0.46	1.24	1.00	8292	4699
age62	0.32	0.49	-0.62	1.28	1.00	8332	4661
age64	-0.11	0.56	-1.21	0.98	1.00	10584	4259
age65	0.16	0.74	-1.26	1.61	1.00	11398	4893
age66	0.19	0.50	-0.77	1.16	1.00	10696	4490
age67	-0.02	0.57	-1.15	1.11	1.00	10562	4342
age68	-0.10	0.50	-1.07	0.88	1.00	9683	4527
age70	-0.01	1.01	-1.97	1.99	1.00	12072	4287
sex_dichotomous2	0.19	0.05	0.10	0.29	1.00	11111	4553

-----

-subset try

```
outcome_subset_try = brm(scale(eyes_test_total) ~ sex_dichotomous,
  data= subset(data_validation_a_, country = Canada),
  prior = pr,
  cores = 6,
)
```

```
canada_data_va <- data_validation_a_ %>% mutate(usa = recode(country,  
  "Canada" = "Canada",  
  .default = "NA")) %>%  
  select(age, sex_dichotomouseyes_test_score, country)
```

---

```
(hsb6 <- hsb2.small[hsb2.small$ses == 1, ])
```

```
canada_data_va <- data_validation_a_[data_validation_a_$country==Canada,]
```