

# Results

## Participant Characteristics

### Model Performance

We optimized each statistical algorithm by tuning hyperparameter values and fitting models across several feature set combinations (i.e., active or passive, and type of feature engineering). Each model configuration was fit using a grouped 1x10 resampling method. Table 1 shows the best performing model (i.e., highest balanced accuracy) for each statistical algorithm. Figure 1 shows the model’s performance in each held out fold.

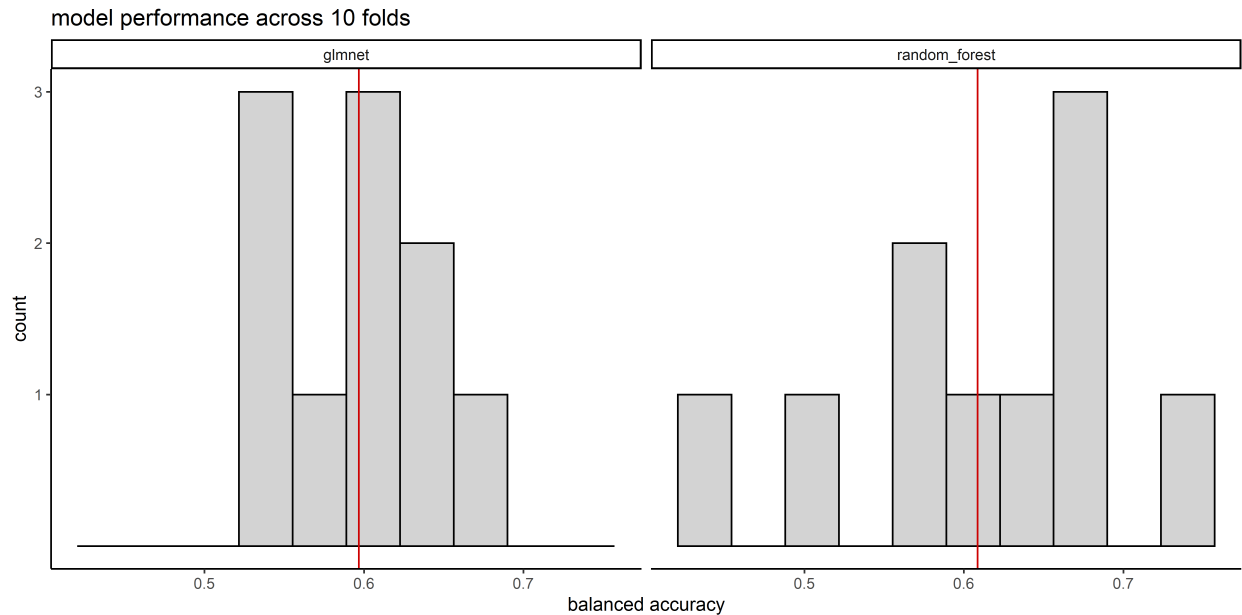


Figure 1. Model performance in each held out fold during model selection.

To reduce the effects of optimization bias on our model evaluation of predictive performance, we refit the top performing model 100 times (grouped 10x10 resampling). We then averaged across performance estimates to get a balanced accuracy value with low variance. Since we did not have an independent held out test set we were not able to completely remove optimization bias. So, we performed a model comparison to assess our model’s performance compared to a null model with no signal. A Bayesian correlated t-test revealed a posterior probability that the balanced accuracy of our model was above the Region of Practical Equivalence (ROPE) is .999 (Figure 2). This suggests there is a meaningful difference between our model and a null model.

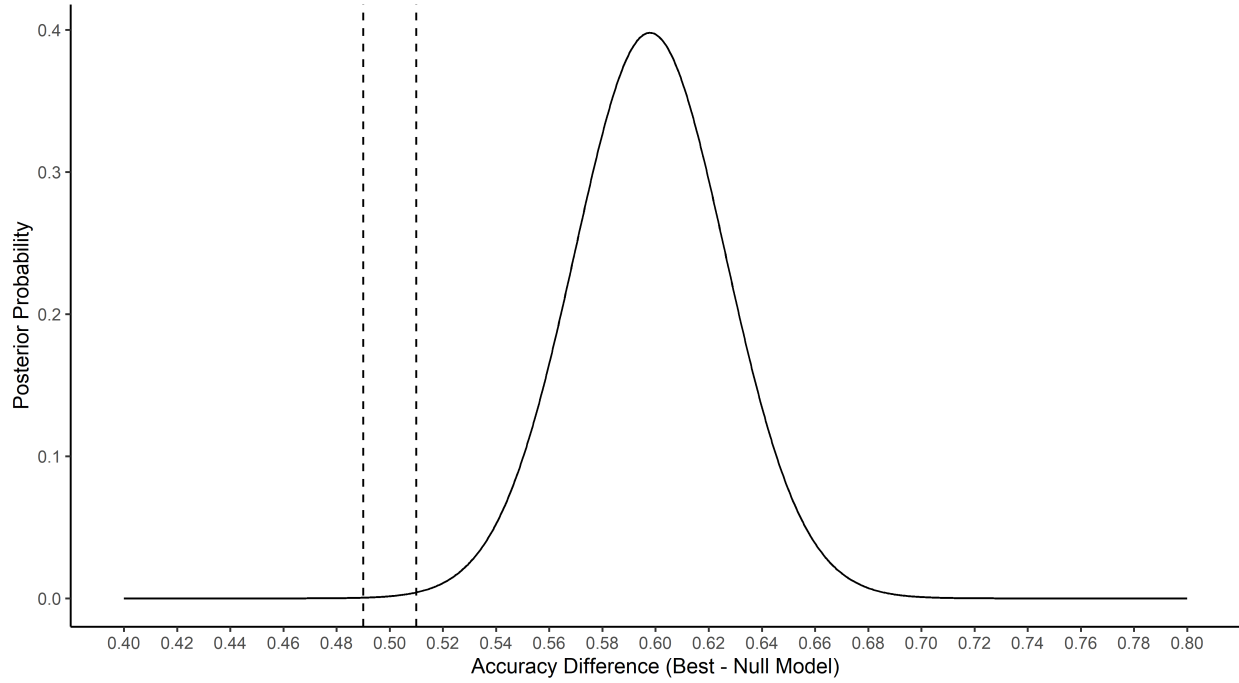
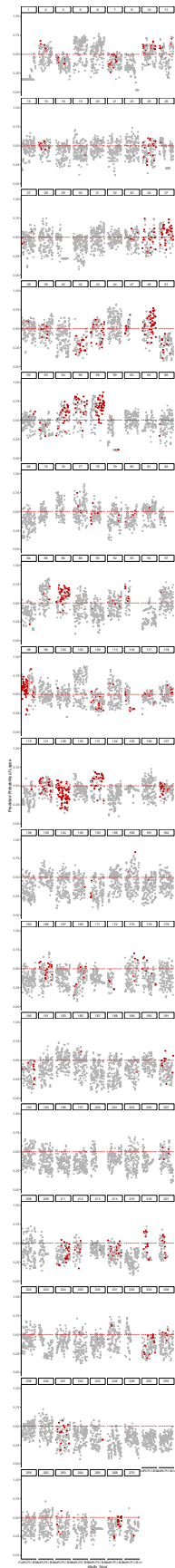


Figure 2. Model comparison of best model and null model.

Figure 3 shows our model predictions for each individual participant. These predictions are predicted probabilities of a lapse. Each observation was held out 10 times and the figure shows the averaged probability across these 10 predictions. Actual lapses, are depicted in red.



1.00	1	2	3
0.95			
0.90			
1.00	4	5	6
0.95			
0.90			
1.00	7	8	9
0.95			
0.90			
1.00	10	11	12
0.95			
0.90			
1.00	13	14	15
0.95			
0.90			
1.00	16	17	18
0.95			
0.90			
1.00	19	20	21
0.95			
0.90			
1.00	22	23	24
0.95			
0.90			
1.00	25	26	27
0.95			
0.90			
1.00	28	29	30
0.95			
0.90			
1.00	31	32	33
0.95			
0.90			
1.00	34	35	36
0.95			
0.90			
1.00	37	38	39
0.95			
0.90			
1.00	40	41	42
0.95			
0.90			
1.00	43	44	45
0.95			
0.90			
1.00	46	47	48
0.95			
0.90			
1.00	49	50	51
0.95			
0.90			
1.00	52	53	54
0.95			
0.90			
1.00	55	56	57
0.95			
0.90			
1.00	58	59	60
0.95			
0.90			
1.00	61	62	63
0.95			
0.90			
1.00	64	65	66
0.95			
0.90			
1.00	67	68	69
0.95			
0.90			
1.00	70	71	72
0.95			
0.90			
1.00	73	74	75
0.95			
0.90			
1.00	76	77	78
0.95			
0.90			
1.00	79	80	81
0.95			
0.90			
1.00	82	83	84
0.95			
0.90			
1.00	85	86	87
0.95			
0.90			
1.00	88	89	90
0.95			
0.90			
1.00	91	92	93
0.95			
0.90			
1.00	94	95	96
0.95			
0.90			
1.00	97	98	99
0.95			
0.90			
1.00	100	101	102
0.95			
0.90			
1.00	103	104	105
0.95			
0.90			
1.00	106	107	108
0.95			
0.90			
1.00	109	110	111
0.95			
0.90			
1.00	112	113	114
0.95			
0.90			
1.00	115	116	117
0.95			
0.90			
1.00	118	119	120
0.95			
0.90			
1.00	121	122	123
0.95			
0.90			
1.00	124	125	126
0.95			
0.90			
1.00	127	128	129
0.95			
0.90			
1.00	130	131	132
0.95			
0.90			
1.00	133	134	135
0.95			
0.90			
1.00	136	137	138
0.95			
0.90			
1.00	139	140	141
0.95			
0.90			
1.00	142	143	144
0.95			
0.90			
1.00	145	146	147
0.95			
0.90			
1.00	148	149	150
0.95			
0.90			
1.00	151	152	153
0.95			
0.90			
1.00	154	155	156
0.95			
0.90			
1.00	157	158	159
0.95			
0.90			
1.00	160	161	162
0.95			
0.90			
1.00	163	164	165
0.95			
0.90			
1.00	166	167	168
0.95			
0.90			
1.00	169	170	171
0.95			
0.90			
1.00	172	173	174
0.95			
0.90			
1.00	175	176	177
0.95			
0.90			
1.00	178	179	180
0.95			
0.90			
1.00	181	182	183
0.95			
0.90			
1.00	184	185	186
0.95			
0.90			
1.00	187	188	189
0.95			
0.90			
1.00	190	191	192
0.95			
0.90			
1.00	193	194	195
0.95			
0.90			
1.00	196	197	198
0.95			
0.90			
1.00	199	200	201
0.95			
0.90			
1.00	202	203	204
0.95			
0.90			
1.00	205	206	207
0.95			
0.90			
1.00	208	209	210
0.95			
0.90			
1.00	211	212	213
0.95			
0.90			
1.00	214	215	216
0.95			
0.90			
1.00	217	218	219
0.95			
0.90			
1.00	220	221	222
0.95			
0.90			
1.00	223	224	225
0.95			
0.90			
1.00	226	227	228
0.95			
0.90			
1.00	229	230	231
0.95			
0.90			
1.00	232	233	234
0.95			
0.90			
1.00	235	236	237
0.95			
0.90			
1.00	238	239	240
0.95			
0.90			
1.00	241	242	243
0.95			
0.90			
1.00	244	245	246
0.95			
0.90			
1.00	247	248	249
0.95			
0.90			
1.00	250	251	252
0.95			
0.90			
1.00	253	254	255
0.95			
0.90			
1.00	256	257	258
0.95			
0.90			
1.00	259	260	261
0.95			
0.90			
1.00	262	263	264
0.95			
0.90			
1.00	265	266	267
0.95			
0.90			
1.00	268	269	270
0.95			
0.90			
1.00	271	272	273
0.95			
0.90			
1.00	274	275	276
0.95			
0.90			
1.00	277	278	279
0.95			
0.90			
1.00	280	281	282
0.95			
0.90			
1.00	283	284	285
0.95			
0.90			
1.00	286	287	288
0.95			
0.90			
1.00	289	290	291
0.95			
0.90			
1.00	292	293	294
0.95			
0.90			
1.00	295	296	297
0.95			
0.90			
1.00	298	299	300
0.95			
0.90			
1.00	301	302	303
0.95			
0.90			
1.00	304	305	306
0.95			
0.90			
1.00	307	308	309
0.95			
0.90			
1.00	310	311	312
0.95			
0.90			
1.00	313	314	315
0.95			
0.90			
1.00	316	317	318
0.95			
0.90			
1.00	319	320	321
0.95			
0.90			
1.00	322	323	324
0.95			
0.90			
1.00	325	326	327
0.95			
0.90			
1.00	328	329	330
0.95			
0.90			
1.00	331	332	333
0.95			
0.90			
1.00	334	335	336
0.95			
0.90			
1.00	337	338	339
0.95			
0.90			
1.00	340	341	342
0.95			
0.90			
1.00	343	344	345
0.95			
0.90			
1.00	346	347	348
0.95			
0.90			
1.00	349	350	351
0.95			
0.90			
1.00	352	353	354
0.95			
0.90			
1.00	355	356	357
0.95			
0.90			
1.00	358	359	360
0.95			
0.90			
1.00	361	362	363
0.95			
0.90			
1.00	364	365	366
0.95			
0.90			
1.00	367	368	369
0.95			
0.90			
1.00	370	371	372
0.95			
0.90			
1.00	373	374	375
0.95			
0.90			
1.00	376	377	378
0.95			
0.90			
1.00	379	380	381
0.95			
0.90			
1.00	382	383	384
0.95			
0.90			
1.00	385	386	387
0.95			
0.90			
1.00	388	389	390
0.95			
0.90			
1.00	391	392	393
0.95			
0.90			
1.00	394	395	396
0.95			
0.90			
1.00	397	398	399
0.95			
0.90			
1.00	400	401	402
0.95			
0.90			
1.00	403	404	405
0.95			
0.90			
1.00	406	407	408
0.95			
0.90			
1.00	409	410	411
0.95			
0.90			
1.00	412	413	414
0.95			
0.90			
1.00	415	416	417
0			

Figure 3. Predicted probabilities of lapse for each participant. A grouped 10x10 resampling method was used to obtain these probabilities. Known lapses are in red. The red dashed line represents the threshold for classifying a probability as a lapse (i.e., everything above the line was predicted to be a lapse).

## **Context Comparison**

### **Top Predictors**