Supplementary information:
Serotonin receptor 1A variation is associated with anxiety and agonistic behavior in chimpanzees

Nicky Staes[1,2,3,*], Chet C. Sherwood[1], Hani Freeman[4], Sarah F. Brosnan[4,5,6], Steven J. Schapiro[4], William D. Hopkins[6,7] and Brenda J. Bradley[1]

[1] Center for the Advanced Study of Human Paleobiology, Department of Anthropology, The George Washington University
[2] Behavioral Ecology and Ecophysiology Group, Department of Biology, University of Antwerp
[3] Centre for Research and Conservation, Royal Zoological Society of Antwerp
[4] Michale E. Keeling Center for Comparative Medicine and Research, The University of Texas MD Anderson Cancer Center
[5] Department of Psychology, Georgia State University, Atlanta, GA 30302
[6] Neuroscience Institute and Language Research Center, Georgia State University, Atlanta, GA 30302
[7] Ape Cognition and Conservation Initiative, Des Moines, IA, USA

* Corresponding author: nickystaes2@gmail.com

Table S1: Values for positive diversifying selection per amino acid codon

AA	ω	p	AA	ω	p	AA	ω	p	AA	ω	p	AA	ω	p	AA	ω	p	AA	ω	p
1	0.00	1.00	62	0.00	1.00	123	0.00	1.00	184	0.00	1.00	245	0.13	0.67	306	0.00	0.67	367	0.00	0.67
2	0.19	0.39	63	0.00	0.67	124	0.00	1.00	185	0.20	0.51	246	0.06	0.67	307	0.00	0.67	368	0.00	0.67
3	0.48	0.35	64	0.00	1.00	125	0.00	0.67	186	0.08	0.67	247	0.00	0.67	308	0.00	1.00	369	0.00	0.67
4	0.26	0.43	65	0.00	1.00	126	0.00	0.67	187	0.00	1.00	248	**8.81**	0.14	309	0.20	0.51	370	0.00	1.00
5	0.00	0.67	66	0.00	1.00	127	0.00	0.67	188	0.00	0.67	249	0.08	0.67	310	0.00	0.67	371	0.00	0.67
6	0.20	0.67	67	0.00	0.67	128	0.00	1.00	189	0.00	0.67	250	0.00	1.00	311	0.13	0.67	372	0.00	0.67
7	0.00	0.67	68	0.00	1.00	129	0.00	1.00	190	0.00	1.00	251	0.05	0.67	312	0.00	0.67	373	0.00	0.67
8	0.00	0.67	69	0.00	0.67	130	0.00	0.67	191	0.00	1.00	252	0.00	1.00	313	**15.82**	0.03	374	0.00	0.67
9	0.00	0.67	70	0.00	0.67	131	0.00	0.67	192	0.00	0.67	253	0.02	0.67	314	0.47	0.34	375	0.00	1.00
10	0.00	1.00	71	0.00	1.00	132	0.00	0.67	193	0.00	0.67	254	0.37	0.67	315	0.14	0.67	376	0.00	1.00
11	0.00	0.67	72	0.00	0.67	133	0.00	1.00	194	0.00	0.67	255	0.00	0.67	316	0.68	0.67	377	0.00	1.00
12	0.00	0.67	73	0.00	1.00	134	0.00	1.00	195	0.00	1.00	256	0.00	0.67	317	0.06	0.67	378	0.00	0.67
13	0.00	0.67	74	0.00	0.67	135	0.00	1.00	196	0.00	0.67	257	0.05	0.67	318	**5.43**	0.31	379	0.00	0.67
14	0.18	0.67	75	0.00	0.67	136	0.00	1.00	197	0.00	0.67	258	0.00	0.67	319	0.00	0.67	380	0.00	0.67
15	0.00	0.67	76	0.00	0.67	137	0.00	0.67	198	0.00	0.67	259	0.00	0.67	320	0.33	0.67	381	0.00	0.67
16	0.16	0.67	77	0.00	0.67	138	0.00	1.00	199	0.00	1.00	260	0.17	0.67	321	0.06	0.67	382	0.00	0.67
17	**324.18**	0.05	78	0.00	0.67	139	0.00	0.67	200	0.00	0.67	261	0.06	0.67	322	0.00	1.00	383	0.00	0.67
18	0.24	0.43	79	0.00	0.67	140	0.00	1.00	201	0.00	0.67	262	0.12	0.67	323	0.06	0.67	384	0.00	0.67
19	0.00	0.67	80	0.00	1.00	141	0.00	0.67	202	0.00	0.67	263	0.00	0.67	324	0.00	0.67	385	0.00	0.67
20	**5.42**	0.33	81	0.00	0.67	142	0.00	0.67	203	0.00	0.67	264	0.00	0.67	325	0.00	0.67	386	0.00	0.67
21	0.00	0.67	82	0.00	0.67	143	0.00	1.00	204	0.00	1.00	265	0.31	0.67	326	0.00	1.00	387	0.00	1.00
22	0.00	0.67	83	0.00	1.00	144	0.00	1.00	205	0.00	0.67	266	0.25	0.67	327	0.00	1.00	388	0.00	0.67
23	**4.62**	0.17	84	0.00	1.00	145	0.00	1.00	206	0.00	0.67	267	0.02	0.67	328	0.24	0.67	389	0.00	0.67
24	0.00	0.67	85	0.00	1.00	146	0.00	1.00	207	0.00	0.67	268	0.43	0.46	329	0.00	0.67	390	0.00	0.67
25	0.96	0.67	86	0.00	0.67	147	0.00	1.00	208	0.00	0.67	269	0.84	0.32	330	**4.20**	0.37	391	0.00	1.00
26	**275.10**	0.03	87	0.00	1.00	148	0.00	1.00	209	0.00	0.67	270	0.13	0.67	331	0.00	0.67	392	0.00	1.00
27	0.00	0.67	88	0.00	0.67	149	0.00	0.67	210	0.00	1.00	271	0.00	0.67	332	0.00	0.67	393	0.00	0.67
28	0.21	0.48	89	0.00	0.67	150	0.00	1.00	211	0.00	1.00	272	**1.05**	0.20	333	0.00	1.00	394	0.00	0.67
29	0.00	0.67	90	0.00	1.00	151	0.00	1.00	212	0.00	1.00	273	0.00	0.67	334	0.00	1.00	395	0.00	0.67
30	0.20	0.51	91	0.00	1.00	152	0.00	1.00	213	0.00	0.67	274	**1.40**	0.02	335	0.00	1.00	396	0.00	0.67
31	0.00	1.00	92	0.00	1.00	153	0.00	0.67	214	0.00	1.00	275	0.98	0.16	336	0.00	0.67	397	0.00	0.67
32	0.00	1.00	93	0.00	0.67	154	0.00	1.00	215	0.00	0.67	276	0.00	0.67	337	0.00	0.67	398	0.00	0.67
33	**153.05**	0.07	94	0.00	0.67	155	0.00	1.00	216	0.00	1.00	277	0.08	0.67	338	0.00	0.67	399	0.00	0.67
34	**5.76**	0.31	95	0.00	0.67	156	0.00	0.67	217	0.00	1.00	278	0.00	0.67	339	0.00	0.67	400	0.00	0.67
35	0.00	0.67	96	0.00	0.67	157	0.00	1.00	218	0.00	0.67	279	0.00	0.67	340	0.00	1.00	401	0.00	0.67
36	0.00	0.67	97	0.00	1.00	158	0.00	0.67	219	0.00	0.67	280	0.00	0.67	341	0.00	0.67	402	0.00	0.67
37	0.00	0.67	98	0.00	0.67	159	0.00	1.00	220	0.00	0.67	281	0.00	0.67	342	0.00	0.67	403	0.00	1.00
38	0.00	1.00	99	0.00	0.67	160	0.00	1.00	221	0.00	0.67	282	0.00	0.67	343	0.00	0.67	404	0.00	1.00
39	0.00	0.67	100	0.00	1.00	161	0.00	1.00	222	0.00	0.67	283	0.05	0.67	344	0.00	1.00	405	0.00	0.67
40	0.00	0.67	101	0.00	0.67	162	0.00	0.67	223	0.00	1.00	284	0.00	0.67	345	0.00	1.00	406	0.00	1.00
41	0.00	0.67	102	0.00	1.00	163	0.00	0.67	224	0.00	1.00	285	0.02	0.67	346	0.00	0.67	407	0.00	0.67
42	0.00	0.67	103	0.00	0.67	164	0.00	1.00	225	0.00	0.67	286	0.08	0.67	347	0.00	1.00	408	0.00	0.67
43	0.00	0.67	104	0.00	1.00	165	0.00	0.67	226	0.00	0.67	287	0.08	0.67	348	0.00	1.00	409	0.00	1.00
44	0.00	0.67	105	0.00	0.67	166	0.00	1.00	227	0.00	0.67	288	0.00	0.67	349	0.00	0.67	410	0.00	0.67
45	0.00	0.67	106	0.00	0.67	167	0.00	0.67	228	0.00	0.67	289	0.22	0.45	350	0.00	0.67	411	0.00	1.00
46	0.00	0.67	107	0.00	0.67	168	0.00	0.67	229	0.00	0.67	290	0.00	0.67	351	0.00	1.00	412	0.00	0.67
47	0.00	0.67	108	0.00	1.00	169	0.00	0.67	230	0.00	0.67	291	0.00	1.00	352	0.00	0.67	413	0.00	1.00
48	0.00	1.00	109	0.00	0.67	170	0.00	1.00	231	0.00	0.67	292	0.00	1.00	353	0.00	0.67	414	0.00	0.67
49	0.00	0.67	110	0.00	1.00	171	0.00	0.67	232	0.00	1.00	293	0.00	0.67	354	**40.25**	0.14	415	0.54	0.67
50	0.00	0.67	111	0.00	0.67	172	0.00	1.00	233	0.50	0.67	294	0.00	0.67	355	0.00	0.67	416	0.02	0.67
51	0.00	0.67	112	0.00	0.67	173	0.00	1.00	234	0.00	0.67	295	0.00	0.67	356	0.00	0.67	417	0.00	0.67
52	0.00	0.67	113	0.00	0.67	174	0.00	0.67	235	0.09	0.67	296	0.00	0.67	357	0.00	1.00	418	0.00	0.67
53	0.00	1.00	114	0.00	1.00	175	0.00	1.00	236	0.00	0.67	297	0.00	0.67	358	0.00	1.00	419	0.00	1.00
54	0.00	1.00	115	0.00	0.67	176	0.00	1.00	237	0.63	0.67	298	0.00	1.00	359	0.00	0.67	420	0.00	1.00
55	0.00	0.67	116	0.00	0.67	177	0.00	1.00	238	0.00	0.67	299	0.00	1.00	360	0.00	0.67	421	0.00	1.00
56	0.00	1.00	117	0.00	1.00	178	0.00	0.67	239	0.64	0.35	300	0.06	0.67	361	0.00	0.67	422	**1.08**	0.66
57	0.00	1.00	118	0.00	0.67	179	0.00	1.00	240	0.42	0.35	301	0.00	1.00	362	0.00	1.00			
58	0.00	0.67	119	0.00	0.67	180	0.00	1.00	241	0.63	0.67	302	0.00	1.00	363	0.00	0.67			
59	0.00	0.67	120	0.00	0.67	181	0.00	1.00	242	0.99	0.67	303	0.21	0.52	364	0.00	1.00			
60	0.00	1.00	121	0.00	0.67	182	0.00	0.67	243	0.00	0.67	304	0.00	1.00	365	0.00	0.67			
61	0.00	0.67	122	0.00	0.67	183	0.20	0.51	244	**1.50**	0.57	305	0.00	0.67	366	0.00	0.67			

Boldface indicates ω>1, underlined shows p-value >0.10, AA indicates amino acid sequence codon number

Table S2: Information for models with significant genotype effects

Display	Parameter	*F*	Df	*p*		Estimate	Std. Error
	relatedness	0.21	1,43	0.650	relatedness	-2.15	3.24
	genotype : sex	4.75	2,43	0.014	genotype AC : sex female	0.07	0.15
					genotype CC : sex female	-0.5	0.19
Proximity	Parameter	*F*	Df	*p*		Estimate	Std. Error
	relatedness	6.16	1,41	0.017	relatedness	36.81	16.38
	genotype : rank	3.28	4,41	0.020	genotype AC : rank medium	1.65	0.92
					genotype AC : rank high	3.16	0.91
					genotype CC : rank medium	0.2	1.05
					genotype CC : rank high	0.02	1.44
Groom other	Parameter	*F*	Df	*p*		Estimate	Std. Error
	genotype	4.93	2,44	0.011	genotype AC	0.03	0.17
					genotype CC	-0.57	0.21
	relatedness	0.72	1,44	0.399	relatedness	6.27	0.40
Anxious	Parameter	*F*	Df	*p*		Estimate	Std. Error
	genotype	4.3	2,209	0.015	genotype AC	-0.242	0.137
					genotype CC	0.35	0.211
	relatedness	5.5	1,209	0.02	relatedness	-9.211	3.943

F = F-test, Df = degrees of freedom, p=p-value, Std. error = standard error. Parameters shown in this table represent parameters belonging to the model with the lowest AIC value. If interaction effects were significant, the parameters for main effects were not interpreted.

Table S3: Mean genotype scores and standard error of behavioral variables and coded dimensions.

	AA		AC		CC	
Behavior	Mean	SE	Mean	SE	Mean	SE
Sexual	0.265	0.040	0.227	0.045	0.300	0.033
Contact aggression	0.116	0.022	0.103	0.018	0.140	0.020
Noncontact aggression	0.212	0.029	0.196	0.026	0.281	0.018
Display	0.544	0.043	0.533	0.046	0.612	0.074
Post-conflict affiliation	0.037	0.010	0.067	0.013	0.013	0.005
Affiliation	0.262	0.016	0.375	0.021	0.381	0.021
Contact sitting	0.527	0.022	0.573	0.038	0.464	0.028
Groom other	1.270	0.075	1.316	0.071	0.714	0.063
Proximity	2.808	0.153	3.060	0.228	1.944	0.163
Play	0.416	0.040	0.337	0.060	0.243	0.028
Begging	0.216	0.024	0.242	0.028	0.230	0.028
Displace	0.135	0.016	0.154	0.018	0.076	0.016
Groom Self	1.236	0.116	0.914	0.068	1.060	0.074
Submissive	0.194	0.023	0.205	0.019	0.203	0.018
Dominance	0.540	0.042	0.551	0.041	0.597	0.021
Affiliation	0.422	0.015	0.612	0.034	0.470	0.026
Proximity	4.330	0.583	4.396	0.536	2.163	0.903
Solitary	1.499	0.135	1.243	0.099	1.645	0.101

In case variables were transformed to adhere to the normality assumption, the means indicated in this table are the means of the variable after transformation.

Table S4: Estimated mean genotype scores on rated personality adjectives and dimensions after correction for relatedness

	AA		AC		CC	
Item	Mean	SE	Mean	SE	Mean	SE
Active	4.16	0.12	4.21	0.12	4.47	0.23
Affectionate	4.71	0.10	4.76	0.10	4.92	0.19
Affiliative	4.72	0.09	4.63	0.09	4.89	0.17
Aggressive	3.77	0.12	3.73	0.12	3.80	0.23
Anxious	3.69	0.10	3.47	0.10	4.04	0.19
Autistic	2.87	0.09	2.92	0.10	3.00	0.19
Bold	4.32	0.11	4.33	0.11	4.17	0.21
Bullying	3.88	0.11	3.69	0.12	3.76	0.22
Calm	3.99	0.10	4.12	0.10	4.16	0.19
Cautious	4.11	0.09	4.16	0.09	4.31	0.18
Considerate/Kind	4.19	0.09	4.27	0.09	4.32	0.18
Deceptive	3.65	0.10	3.49	0.10	3.53	0.19
Defiant	3.86	0.11	3.75	0.11	3.93	0.21
Dependent	4.06	0.10	4.06	0.10	4.23	0.19
Depressed	3.14	0.09	3.14	0.09	3.13	0.17
Dominant	4.24	0.13	4.13	0.13	4.21	0.25
Eccentric	3.58	0.10	3.68	0.11	3.69	0.21
Excitable	4.35	0.11	4.16	0.11	4.38	0.21
Fearful	3.69	0.10	3.65	0.10	4.05	0.20
Human oriented	4.53	0.13	4.49	0.13	4.41	0.25
Impulsive	3.82	0.09	3.65	0.10	3.80	0.19
Inquisitive	4.44	0.09	4.45	0.09	4.68	0.18
Intelligent	4.82	0.09	4.71	0.09	4.83	0.18
Inventive	3.95	0.10	4.04	0.10	4.17	0.20
Irritable	3.72	0.10	3.66	0.10	3.71	0.20
Jealous	4.45	0.10	4.21	0.10	4.69	0.20
Manipulative	4.10	0.10	4.09	0.10	3.88	0.19
Methodical	4.21	0.08	4.14	0.08	4.28	0.16
Mischievous	3.72	0.11	3.79	0.11	3.92	0.21
Persistent	4.52	0.07	4.58	0.08	4.72	0.14
Playful	4.04	0.12	4.11	0.12	4.23	0.23
Predictable	4.68	0.08	4.81	0.08	4.74	0.15
Protective	4.20	0.10	4.26	0.10	4.29	0.19
Relaxed	4.19	0.09	4.39	0.09	4.15	0.18
Self-caring	4.64	0.08	4.74	0.08	4.92	0.15
Sexual	4.13	0.11	3.99	0.11	4.47	0.22
Socially inept	3.07	0.09	3.15	0.09	3.17	0.18
Solitary	3.64	0.10	3.52	0.10	3.44	0.19
Stingy	4.39	0.10	4.20	0.11	4.29	0.20
Temperamental moody	3.85	0.10	3.71	0.11	3.80	0.20
Timid	3.48	0.10	3.38	0.11	3.67	0.20
Reactivity	3.87	0.07	3.78	0.07	3.87	0.13
Dominance	4.22	0.07	4.27	0.07	4.03	0.14
Openness	4.50	0.07	4.51	0.07	4.62	0.14
Extraversion	4.38	0.07	4.38	0.08	4.58	0.14
Agreeableness	4.20	0.08	4.27	0.09	4.30	0.17
Methodical	4.43	0.06	4.44	0.06	4.60	0.12

Table S5: Species included in mixed effects model of evolution to test for diversifying selection

Scientific name	Common name	Genome	Order
Callithrix jacchus	Common marmoset	calJac3	Primates
Cebus capucinus imitator	Panamanian white-throated capuchin	cebCap1	Primates
Cercocebus atys	Sooty mangabey	cerAty1	Primates
Chlorocebus sabaeus	Green monkey	chlSab2	Primates
Colobus angolensis palliatus	Angolan colobus	colAng1	Primates
Eulemur flavifrons	Blue-eyed black lemur	eulFla1	Primates
Eulemur macaco	Black lemur	eulMac1	Primates
Gorilla gorilla gorilla	Western lowland gorilla	gorGor5	Primates
Homo sapiens	Human	hg38	Primates
Macaca fascicularis	Crab eating macaque	macFas5	Primates
Macaca mulatta	Rhesus macaque	rheMac8	Primates
Macaca nemestrina	Pig tailed macaque	macNem1	Primates
Mandrillus leucophaeus	Drill	manLeu1	Primates
Microcebus murinus	Gray mouse lemur	micMur3	Primates
Nomascus leucogenys	Northern white-cheeked gibbon	nomLeu3	Primates
Otolemur garnettii	Northern greater galago	otoGar3	Primates
Pan paniscus	Bonobo	panPan2	Primates
Pan troglodytes	Chimpanzee	panTro5	Primates
Papio anubis	Olive baboon	papAnu3	Primates
Pongo abelii	Sumatran orang-utan	ponAbe2	Primates
Propithecus coquereli	Coquerel's sifaka	proCoq1	Primates
Rhinopithecus bieti	Black snub nosed monkey	rhiBie1	Primates
Rhinopithecus roxellana	Golden snub nosed monkey	rhiRox1	Primates
Saimiri boliviensis	Black-capped squirrel monkey	saiBol1	Primates
Tarsius syrichta	Philippine tarsier	tarSyr2	Primates
Mus musculus	House mouse	mm10	Rodentia
Canis lupus familiaris	Domestic dog	canFam3	Carnivora

Table S6: Factor loadings of chimpanzee personality traits on six varimax-rotated factors

Trait	Reactivity/ Undependability	Dominance	Extraversion	Openness	Agreeableness	Methodical
Irritable	**0.87**	-0.09	-0.05	-0.09	-0.13	0.15
Temp./moody	**0.85**	-0.01	0.04	-0.02	-0.08	0.18
Deceptive	**0.79**	-0.13	0.12	0.18	0.18	0.05
Impulsive	**0.77**	-0.04	0.28	0.27	0.00	-0.12
Defiant	**0.74**	-0.06	0.31	0.22	-0.03	-0.10
Mischievous	**0.73**	0.07	0.41	0.33	-0.01	-0.13
Jealous	**0.70**	-0.07	0.35	0.40	0.02	0.05
Manipulative	**0.68**	-0.35	0.14	0.18	0.25	0.09
Stingy	**0.68**	-0.49	0.07	-0.06	0.23	0.03
Bullying	**0.68**	-0.56	0.25	-0.07	0.06	0.03
Aggressive	**0.66**	-0.42	0.41	-0.12	-0.06	0.14
Eccentric	**0.62**	0.13	-0.22	0.36	-0.04	-0.14
Socially-inept	**0.58**	0.36	0.02	0.07	-0.37	-0.06
Calm	**-0.57**	-0.06	-0.50	0.02	0.37	-0.10
Excitable	**0.56**	-0.08	0.49	0.19	-0.22	0.09
Autistic	**0.42**	0.36	-0.22	0.05	-0.03	-0.28
Fearful	0.03	**-0.88**	-0.11	0.05	-0.12	-0.01
Timid	-0.14	**-0.84**	-0.27	-0.23	-0.09	-0.04
Cautious	-0.23	**-0.81**	-0.11	-0.13	0.07	-0.01
Dominant	0.40	**0.78**	0.16	-0.03	0.18	0.13
Dependent	-0.02	**-0.76**	0.21	0.01	0.30	-0.15
Anxious	0.32	**-0.75**	0.28	-0.07	-0.05	0.20
Bold	0.53	**0.61**	0.35	0.29	0.12	0.05
Relaxed	-0.44	**0.48**	-0.46	0.05	0.31	-0.15
Solitary	-0.18	0.16	**-0.77**	-0.18	-0.29	0.08
Depressed	0.03	0.32	**-0.76**	-0.13	0.02	0.01
Active	0.26	0.09	**0.72**	0.47	-0.10	0.12
Playful	0.20	0.06	**0.67**	0.58	-0.06	-0.09
Sexual	0.29	-0.07	**0.65**	0.01	0.30	0.22
Affiliative	0.09	0.09	**0.53**	0.43	0.49	0.02
Human oriented	0.08	-0.14	-0.02	**0.83**	0.01	0.05
Inq./Curious	0.26	-0.01	0.30	**0.80**	-0.03	0.00
Inventive	0.28	0.03	0.20	**0.76**	0.12	0.14
Intelligent	-0.01	-0.19	0.09	**0.70**	-0.08	0.50
Aff./Friendly	-0.28	-0.03	0.27	**0.61**	0.41	-0.11
Persistent	0.46	-0.34	0.10	**0.54**	0.11	0.15
Protective	0.15	-0.20	0.06	-0.08	**0.78**	0.15
Considerate	-0.44	0.16	-0.01	0.25	**0.63**	0.14
Self-caring	0.05	0.06	0.20	0.31	0.32	**0.55**
Methodical	0.16	-0.44	-0.26	0.30	0.33	**0.54**

Boldface indicates the items with loadings >0.40 that load onto the factor

Table S7: Behavioral variables used to determine personality model based on codings

Variable	Definition	Method
Solicit	One individual solicits another for assistance, typically during a fight, but may be a solicitation for "consolation" after a fight. This is done with an arm outstretched towards the individual from whom assistance is	ad libitum
Sexual	Any form of initiated sexual behavior between two individuals. This includes solicits, presents, erections (directed at a female), exploration behavior, mounts, and thrusts.	ad libitum
Contact aggression	Aggression that does include contact between the animals, such as hitting, jumping on, biting.	ad libitum
Noncontact aggression	Aggression that does not result in contact between the animals. Examples include screaming at, chasing.	ad libitum
Displace	One chimpanzee (A) gives way to another (B), who approaches. Chimpanzee B then claims the sitting space, grooming partner, food, toy, etc that chimpanzee A has left behind.	ad libitum
Affiliation	Any affiliative interaction which does not fall under the aggressive, submissive, or sexual behavior categories. This may include tandem walking, embrace/kissing, etc. Tandem walk - can be side-by-side or dorsal-ventral. One or both arms of the initiator are placed around the body of the partner from the side or from immediately behind the partner such that bodily contact is made. Does not include carrying of infant by mother. Embrace/Kiss - a ventro-ventral contact when two individuals face each other and each puts both arms around the other or contact with both arms of an individual encompassing another from behind. Alternately, individual brings lips in contact with another individual. Can be mouth-to-mouth or mouth-to-any other body part.	ad libitum
Post-conflict affiliation	Same as above, but following with 60 seconds of (or within the same bout as) an incident of aggression.	ad libitum
Contact	Individuals are touching in any situation. Can include draping over the other, touching in sitting, standing, or laying down positions, etc.	scan
Play	Nonaggressive interactions involving two or more animals. Never accompanied by piloerection, may be accompanied by play-face and/or laughing. Includes rough-and-tumble play (fast paced, vigorous locomotion, wrestling, hitting, pulling, chasing, biting, etc.), quiet play (slower paced, gentle tickling, finger and toe manipulation, etc.), object play, and social play initiation. For solitary play, indicate "no partner". **Note that at some point, this was indicated using 'self'.	scan
Begging	One individual begs for food from another, by sticking out the hand or placing the face close to that of the eating chimpanzee.	scan
Groom other	Picking through the hair, searching for and/or removing debris. May be accomplished with hand or mouth. Often accompanied by teeth clacking or lip smacking. Social groom can be directed to another animal or received from another animal. This category also includes scratching (scraping of fingernails across the skin).	scan
Groom self	Same as above but directed to itself instead of a social partner.	scan
Proximity	Individuals are within arm's reach (approximately 1 meter) of their nearest neighbor. Only record for individuals in proximity, all others are presumed to be distant.	scan
Display	Behavioral sequence incorporating such elements as drumming, repeated swaying, exaggerated, often bipedal locomotion, charging and pilo-erection. Also often includes a repetitive slapping of the ground which begins slowly and gradually becomes more vigorous. It may or may not be accompanied by a pant-hoot call. Note the use of objects in display.	ad libitum
Fear grimace	One individual bares teeth while grinning upon an aggression received	ad libitum
Submissive	Any submissive behavior directed at the other individual, including pant grunts, bowing, crouching, bobbing, flinching, avoiding, presenting (in a non-sexual context), presenting the wrist, or, bared-teeth display during aggression received	ad libitum
Intervene	Interrupting an interaction between two or more individuals; often an interaction is terminated. The intervening animal generally moves quickly where the interaction is taking place, moves between the two animals and may threaten one or both of them.	ad libitum

Table S8: Individuals and subgroup compositions for coding data

Individual	sex	Group	rank	genotype	age	relatedness
X1	Female	1	Medium	AA	30	0.032
X2	Male	1	High	AA	20	0.061
X3	Male	1	Medium	AA	15	0.018
X4	Female	1	Medium	AC	27	0.011
X5	Male	1	Low	AA	41	0.014
X6	Male	1	Medium	AA	41	0.017
X7	Female	1	Medium	AC	21	0.014
X8	Female	1	Medium	CC	46	0.006
X9	Female	1	Medium	AC	46	0.008
X10	Male	1	High	AA	21	0.024
X11	Male	1	High	AA	41	0.011
X12	Female	1	High	AC	49	0.014
X13	Male	1	Low	AA	17	0.024
X14	Female	2	High	AC	46	0.026
X15	Female	2	High	AC	36	0.011
X16	Male	2	Medium	CC	19	0.020
X17	Male	2	High	CC	19	0.027
X18	Female	2	Low	CC	19	0.028
X19	Female	2	Medium	CC	24	0.027
X20	Female	2	Low	CC	19	0.036
X21	Female	2	High	AC	43	0.017
X22	Female	2	High	AC	29	0.021
X23	Female	2	Medium	AC	21	0.030
X24	Female	3	Low	CC	22	0.014
X25	Male	3	High	AC	29	0.019
X26	Female	3	High	AA	27	0.011
X27	Male	3	Medium	CC	28	0.034
X28	Female	3	Medium	AC	51	0.006
X29	Male	3	Low	AC	12	0.020
X30	Male	3	High	AC	28	0.023
X31	Female	3	Medium	AA	40	0.006
X54	Female	3	Medium	AA	36	0.008
X32	Female	4	Low	AA	45	0.011
X33	Male	4	High	AC	23	0.013
X34	Female	4	Medium	CC	45	0.006
X35	Male	4	NA	AC	32	0.0083
X36	Female	4	Low	AC	27	NA
X37	Female	4	Medium	AA	48	0.006
X38	Male	4	NA	AC	33	0.0083
X39	Female	5	Medium	AC	44	0.011
X40	Female	5	Low	AA	40	0.008
X41	Male	5	Medium	AC	39	0.006
X42	Male	5	High	AA	41	0.014
X43	Female	5	Low	AC	28	0.014
X44	Female	5	Medium	AC	45	0.008
X45	Male	5	High	AC	24	0.015
X46	Female	5	Low	AA	19	0.014
X47	Female	6	Low	AA	22	0.017
X48	Male	6	High	AA	20	0.006
X49	Female	6	Low	AA	43	0.008
X50	Female	6	Medium	AA	45	0.006
X51	Female	6	Medium	AC	46	0.006
X52	Male	6	High	AA	50	0.006
X53	Female	6	Low	AC	8	0.006

Table S9: Factor loadings of chimpanzee personality traits on four coded varimax-rotated factors

Behavior	Dominance	Affiliation	Proximity	Solitary
Solicit	**0.71**	0.04	-0.05	-0.09
Sexual	**0.70**	0.07	0.18	0.03
Contact aggression	**0.69**	0.04	-0.06	0.13
Non-contact aggression	**0.61**	0.06	0.00	0.55
Displace	**0.48**	-0.25	0.20	-0.24
Post-Conflict affiliation	0.10	**0.76**	-0.11	-0.14
Affiliation	0.16	**0.74**	0.18	0.06
Contact	-0.15	**0.69**	-0.15	-0.13
Play	0.07	0.17	**-0.75**	-0.11
Begging	0.05	0.35	**-0.72**	-0.04
Groom other	0.20	0.27	**0.60**	-0.17
Proximity	0.28	0.18	**0.56**	-0.16
Display	0.53	0.04	0.34	**0.59**
Fear grimace	-0.05	0.02	-0.21	**0.54**
Submissive	0.38	0.31	0.06	**-0.48**
Groom self	0.08	-0.15	0.04	**0.48**
Intervene	-0.11	0.34	0.32	0.38

Boldface indicates the items with loadings >0.40 that load onto the factor

Figure S1: Genotype effects on individual behaviors potentially reflecting anxiety: (A) fear grimace (B) self-grooming

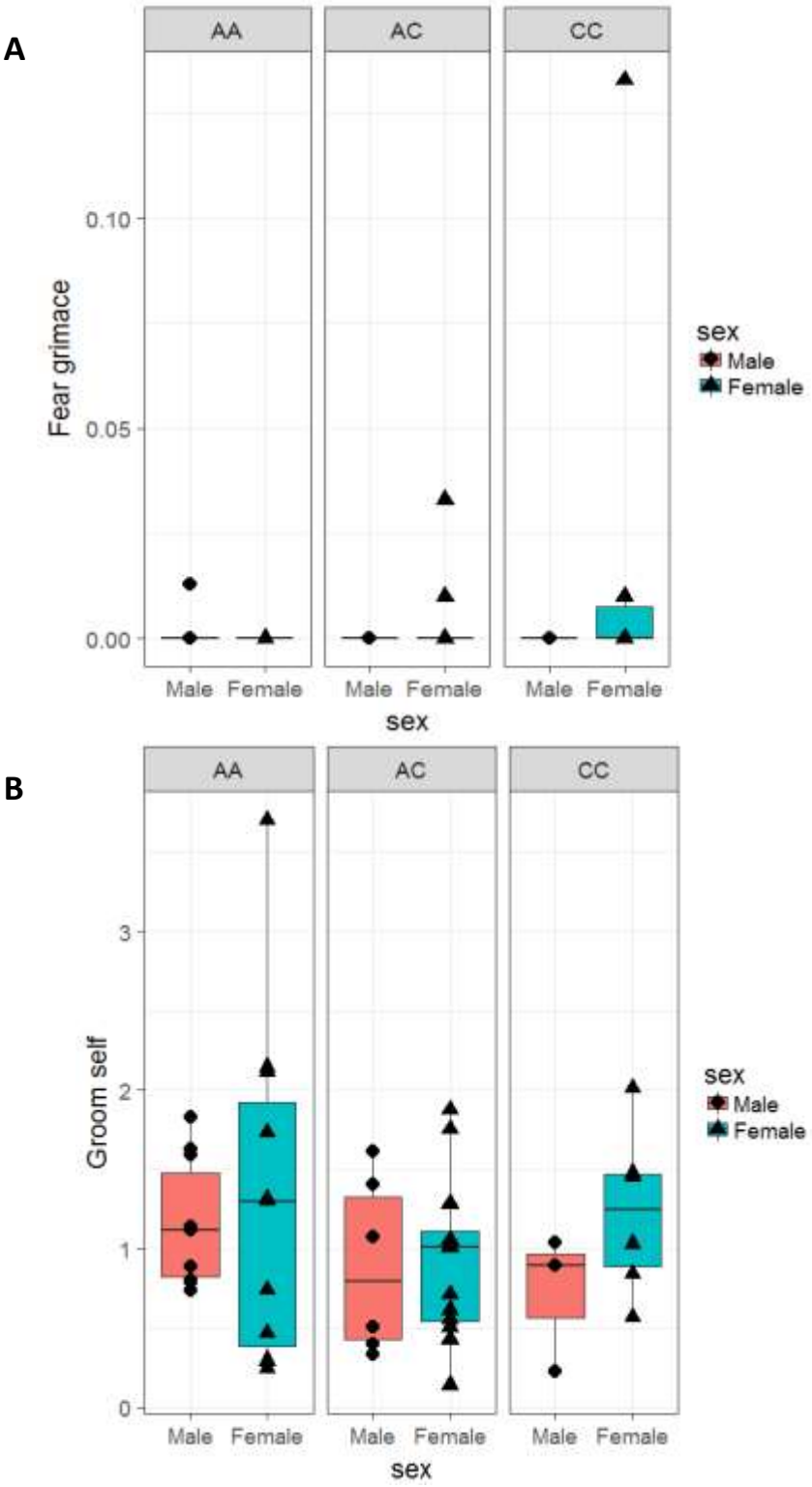

Figure S2: Genotype by sex interaction effects on individual behaviors potentially reflecting agonistic behavior: (A) contact aggression (B) non-contact aggression (C) aggressiveness