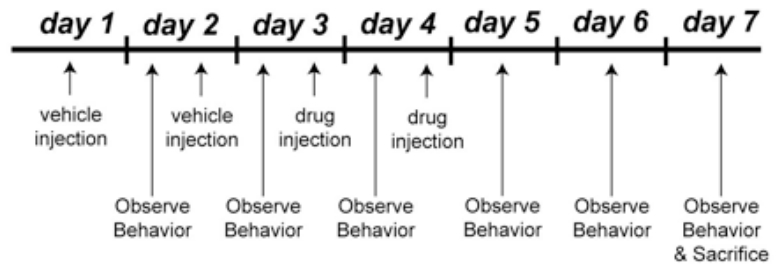
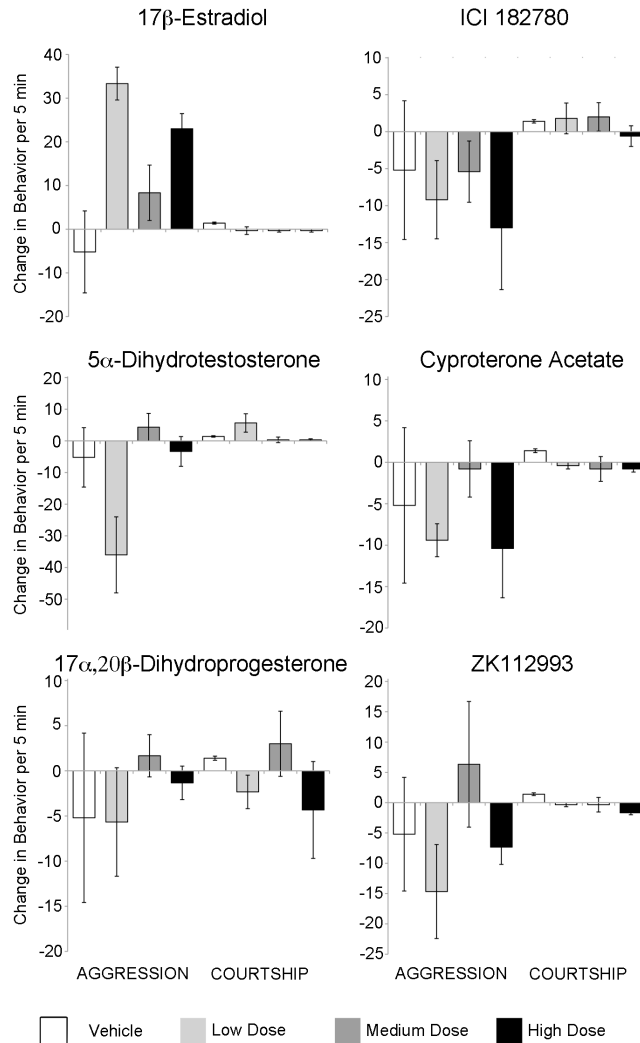


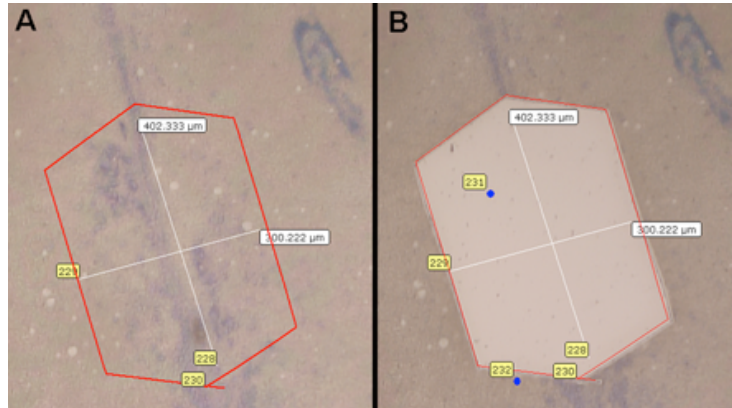
## Supplementary Figures



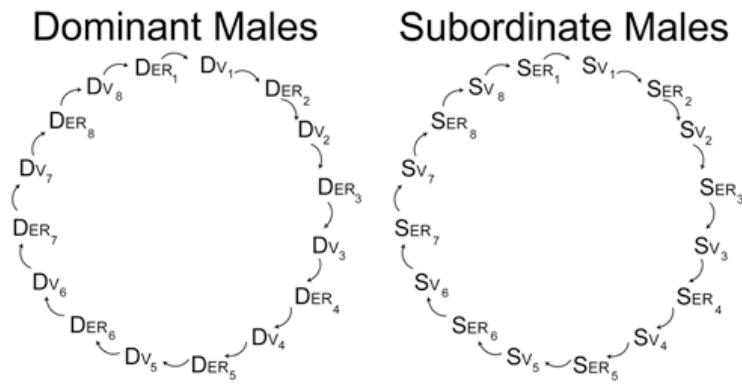
**Supplemental Fig 1. Behavioral testing timeline.** Timeline indicated order of control and drug injections for each individual as well as observation periods.



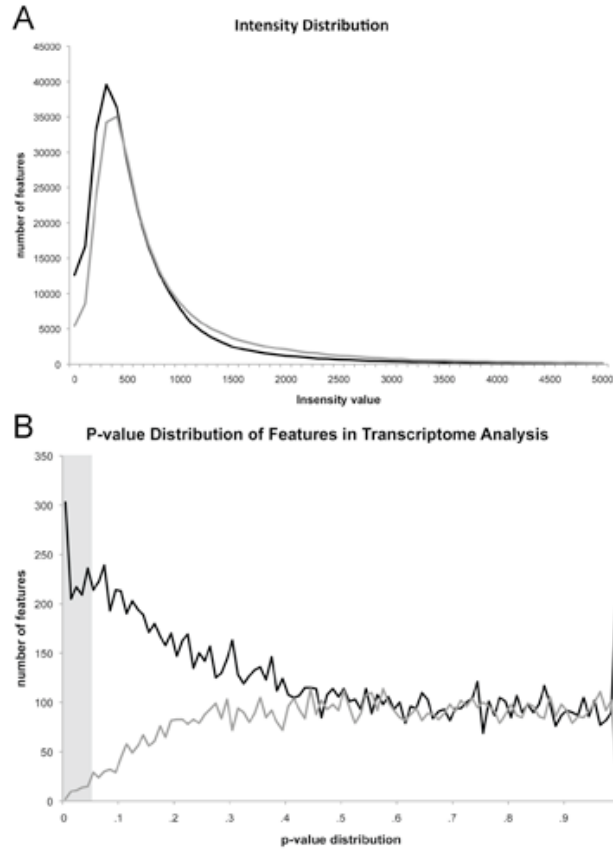
**Supplemental Fig 2. Dose response curve for steroid receptor agonists and antagonists.** Average change in behavior counts (post- minus pre-treatment) of dominant males during a five min observation is shown with error bars  $\pm$ SEM. Males ( $n=3$  per dose of agonists;  $n=5$  per dose of antagonist) were injected the afternoon and observed the morning of the following day and aggression (first four bars), courtship (last four bars) and locomotion (data not shown) was recorded. Doses (vehicle = white; low dose = light grey; medium dose = medium grey; high dose = black) were as follows represented as micrograms administered per gram body weight (bold indicates dose chosen for experiment): 17 $\beta$ -Estradiol, low=0.004 $\mu$ g/g, medium=0.04 $\mu$ g/g, **high=0.4 $\mu$ g/g**; ICI 182780, low=0.06 $\mu$ g/g, medium=0.16 $\mu$ g/g, **high=1.6 $\mu$ g/g**; 5 $\alpha$ -dihydrotestosterone, **low=0.033 $\mu$ g/g**, medium=0.13 $\mu$ g/g, high=1.3 $\mu$ g/g; Cyproterone acetate, low=0.008 $\mu$ g/g, medium=0.08 $\mu$ g/g, **high=0.83 $\mu$ g/g**; 17 $\alpha$ ,20 $\beta$ -dihydroprogesterone, low=0.013 $\mu$ g/g, **medium=0.125 $\mu$ g/g**, high=1.25 $\mu$ g/g; ZK112993, low=0.02 $\mu$ g/g, medium=0.16 $\mu$ g/g, **high=1.60 $\mu$ g/g**. Note that the medium dose for DHT was chosen as the low dose severely suppressed overall locomotor activity (data not shown), which confounds the decrease in aggression.



**Supplemental Fig 3. Laser-microdissection of the POA.** Micrographs indicate microdissection of the POA before (left) and after (right) capture.



**Supplemental Fig 4. Hybridization design for microarray analysis.** RNA from the POA of dominant (left) or subordinate (right) males receiving either an ER antagonist or control were compared within each social state. Each individual was hybridized twice and dye-swapped to control for dye bias.



**Supplemental Fig 5. Microarray measure distribution across all features.** A. Distribution of intensity values across all features for dominant (black) and subordinate (grey) males. B. Distribution of p-values from comparisons between the ER antagonist treated group and the control group are shown for dominant (black) and subordinate (grey) males. Note the selection of low p-values in dominant males and a suppression of significant p-values in subordinate males. Vertical grey bar indicates significance value cut-off for LIMMA analysis ( $p < 0.05$ ).

**Supplemental Table 1. Primers used during reverse transcription and qPCR**

<b>Primer name</b>	<b>Primer sequence</b>
AR $\alpha$ reverse transcription	5'- AACTGCGATCTGTGCAATTCAT
AR $\alpha$ forward primer	5'- CAGGAATGCCGCTGTATCTG
AR $\alpha$ reverse primer	5'- TGAGGAATCGCACTTGGGTA
AR $\beta$ reverse transcription	5'- GTAAGTGACATCCAGCCATTCG
AR $\beta$ forward primer	5'- AGCTTCGGCGACAAGTACAAC
AR $\beta$ reverse primer	5'- GGTCCCGTCATATGGATTGC
ER $\alpha$ reverse transcription	5'- ACCACTTGTACTGCTGCTGCTC
ER $\alpha$ forward primer	5'- CTACGAAGTGGGCATGATGAAA
ER $\alpha$ reverse primer	5'- GGTCTTTGGCTGGTTTGTCTCT
ER $\beta$ a reverse transcription	5'- TCCTCACACTCTTGCTGGTTGT
ER $\beta$ a forward primer	5'- ATGACTTCGCCACCATACCTTT
ER $\beta$ a reverse primer	5'- GAGACTGATGGACAGAGGAGCA
ER $\beta$ b reverse transcription	5'- TGTCCTTGGATGCTTCTCTTGA
ER $\beta$ b forward primer	5'- GGATCCCAAAGTTCACGGTATC
ER $\beta$ b reverse primer	5'- TGAGCACGATGAGGATTTCACT
PR reverse transcription	5'- AGTTTCCTCCCTCCAAGCATC
PR forward primer	5'- TGGCTGCCACTATGGAGTCTT
PR reverse primer	5'- TGTCCACAATGCAGTCATTCC
AVT reverse transcription	5'- TCCAGGTCTTGAGCAGCAGA
AVT forward primer	5'- AGGCAGGAGGGAGATCCTGT
AVT reverse primer	5'- CAGGCAGTCAGAGTCCACCAT
IST reverse transcription	5'- ATGCAGGAGCCTGAGGATGA
IST forward primer	5'- GGAAACAGCTCACTGTGTGGA
IST reverse primer	5'- AGCACAGCGTCCTCCTTCAG

Primers used for gene-specific transcription as well as qPCR amplification for each sex steroid receptor and neuropeptide gene is listed.

**Supplemental Table 2. Genes regulated by ER in the POA of both DOMs and SUBs**

<b>Array ID</b>	<b>Genbank Accession Number</b>
hh_Ab_Pinky2003_000010941	Not in genbank
hh_Ab_Pinky2003_000011443	DY632120
hh_Ab_Pinky2003_000011449	DY632131
hh_Ab_Pinky2003_000014803	DY626358

Supplemental Table 3. Correlations in Dominant Males

E	P	GSI	Chase	Threat	BD	Court	Feed	AR $\alpha$	AR $\beta$	ER $\alpha$	ER $\beta$ a	ER $\beta$ b	PR	AVT	IST	
-0.053 0.770	0.014 0.938	-0.009 0.960	<b>0.475</b> <b>0.005</b>	0.080 0.659	0.084 0.641	<b>0.522</b> <b>0.002</b>	0.241 0.176	0.165 0.394	-0.055 0.782	0.091 0.644	-0.379 0.051	0.123 0.523	-0.184 0.323	-0.020 0.916	0.063 0.738	T
	<b>0.704</b> <b>4.9E-6</b>	<b>0.593</b> <b>0.0002</b>	0.254 0.147	0.142 0.422	-0.037 0.836	<b>0.373</b> <b>0.030</b>	<b>-0.424</b> <b>0.012</b>	-0.272 0.146	0.118 0.542	-0.149 0.441	0.157 0.424	-0.295 0.114	-0.284 0.155	-0.071 0.700	-0.082 0.654	E
		<b>0.508</b> <b>0.003</b>	0.267 0.133	0.188 0.295	-0.173 0.334	0.339 0.053	-0.196 0.274	0.021 0.913	0.090 0.650	0.033 0.868	0.375 0.054	-0.247 0.197	-0.273 0.138	-0.142 0.448	-0.044 0.814	P
			-0.030 0.867	-0.137 0.439	-0.275 0.116	0.156 0.377	<b>-0.367</b> <b>0.033</b>	-0.247 0.189	0.033 0.867	-0.146 0.449	0.214 0.273	-0.025 0.894	-0.149 0.416	-0.188 0.303	-0.201 0.271	GSI
				<b>0.382</b> <b>0.026</b>	0.212 0.228	<b>0.553</b> <b>0.001</b>	0.037 0.835	-0.089 0.641	-0.097 0.615	<b>-0.432</b> <b>0.019</b>	-0.291 0.133	-0.214 0.257	-0.093 0.611	-0.004 0.982	0.096 0.602	Chase
					<b>0.571</b> <b>0.0004</b>	0.243 0.167	0.143 0.421	0.090 0.637	-0.194 0.314	-0.257 0.179	-0.037 0.854	<b>-0.541</b> <b>0.002</b>	-0.077 0.673	0.094 0.610	0.044 0.812	Threat
						0.063 0.725	0.170 0.336	0.011 0.956	-0.141 0.467	-0.171 0.375	<b>-0.466</b> <b>0.012</b>	<b>-0.459</b> <b>0.011</b>	-0.006 0.972	-0.098 0.592	-0.065 0.726	BD
							-0.077 0.665	-0.177 0.350	-0.180 0.350	-0.098 0.613	-0.116 0.557	-0.028 0.884	0.019 0.917	0.154 0.399	0.088 0.632	Court
								0.045 0.812	-0.109 0.575	0.112 0.563	-0.129 0.513	-0.305 0.102	-0.192 0.293	0.036 0.847	0.311 0.084	Feed
									0.361 0.064	<b>0.396</b> <b>0.037</b>	0.320 0.111	0.020 0.918	-0.004 0.981	-0.220 0.242	-0.226 0.230	AR $\alpha$
										0.333 0.096	0.313 0.127	-0.084 0.687	-0.189 0.327	-0.254 0.183	-0.196 0.307	AR $\beta$
											<b>0.412</b> <b>0.033</b>	0.161 0.422	0.018 0.927	-0.038 0.845	0.121 0.531	ER $\alpha$
												-0.052 0.796	-0.119 0.546	-0.023 0.908	0.006 0.975	ER $\beta$ a
													0.276 0.140	0.237 0.208	0.024 0.900	ER $\beta$ b
														0.222 0.222	0.040 0.827	PR
															<b>0.606</b> <b>0.0002</b>	AVT

Spearman Correlation Coefficients (top) and p-values (bottom) are shown for correlations between brain gene expression, hormones, and behavior. Values in bold are significant ( $p < 0.05$ ). Abbreviations: T, testosterone; E, estradiol; P, progesterone; GSI, gonadal somatic index; BD, border dispute.

Supplemental Table 4. Correlations in Subordinate Males

E	P	GSI	Flee	Agg	Feed	AR $\alpha$	AR $\beta$	ER $\alpha$	ER $\beta$ a	ER $\beta$ b	PR	AVT	IST	
<b>0.838</b> <b>7.8E-9</b>	<b>0.603</b> <b>0.0004</b>	<b>0.513</b> <b>0.004</b>	0.175 0.356	-0.152 0.424	-0.058 0.762	0.105 0.610	0.314 0.144	0.158 0.451	0.241 0.235	-0.034 0.875	-0.116 0.565	-0.143 0.478	0.063 0.753	T
	<b>0.609</b> <b>0.0004</b>	<b>0.648</b> <b>0.0001</b>	0.159 0.400	-0.146 0.442	-0.058 0.762	0.322 0.108	<b>0.544</b> <b>0.007</b>	0.025 0.904	-0.036 0.860	0.024 0.910	-0.211 0.292	-0.153 0.446	0.071 0.723	E
		0.263 0.160	0.087 0.647	-0.012 0.949	0.032 0.866	-0.110 0.591	0.243 0.265	0.279 0.177	0.265 0.191	-0.008 0.971	0.059 0.772	0.291 0.140	0.363 0.063	P
			0.188 0.303	0.078 0.673	0.113 0.540	<b>0.463</b> <b>0.013</b>	<b>0.434</b> <b>0.030</b>	-0.053 0.791	-0.149 0.448	-0.057 0.793	-0.186 0.333	-0.290 0.134	-0.056 0.772	GSI
				<b>-0.503</b> <b>0.001</b>	<b>0.513</b> <b>0.003</b>	0.076 0.702	0.280 0.175	0.120 0.552	-0.015 0.939	0.085 0.693	0.012 0.952	-0.061 0.760	0.144 0.455	Flee
					-0.037 0.841	0.091 0.645	-0.131 0.532	-0.039 0.848	-0.075 0.705	-0.231 0.277	-0.011 0.953	-0.116 0.558	-0.030 0.877	Agg
						-0.093 0.638	0.102 0.626	0.030 0.881	0.064 0.748	-0.349 0.095	<b>0.406</b> <b>0.029</b>	-0.164 0.403	-0.072 0.712	Feed
							<b>0.619</b> <b>0.001</b>	0.296 0.141	-0.013 0.951	-0.084 0.703	<b>-0.493</b> <b>0.009</b>	-0.189 0.355	0.049 0.809	AR $\alpha$
								0.319 0.138	0.102 0.643	-0.108 0.649	-0.356 0.088	-0.161 0.462	0.027 0.900	AR $\beta$
									<b>0.458</b> <b>0.021</b>	-0.188 0.398	-0.109 0.597	<b>0.402</b> <b>0.047</b>	0.336 0.094	ER $\alpha$
										0.051 0.820	0.301 0.119	0.335 0.094	0.142 0.479	ER $\beta$ a
											0.009 0.968	0.368 0.084	<b>0.462</b> <b>0.026</b>	ER $\beta$ b
												0.271 0.171	0.136 0.489	PR
													<b>0.799</b> <b>3.4E-7</b>	AVT

Spearman Correlation Coefficients (top) and p-values (bottom) are shown for correlations between brain gene expression, hormones, and behavior. Numbers in bold are significant ( $p < 0.05$ ). Abbreviations: T, testosterone; E, estradiol; P, progesterone; GSI, gonadal somatic index; Agg, aggression.