

Supplemental Table 2: Tests of gene-gene interactions for pairs of SNPs in SNCA, MAPT and LRRK2 in the sample overall as well as in strata based on sex, type of control (sibling or unrelated) and age at onset of the case. Results are sorted by p-value for the interaction in the sample overall.

SNP1	Gene1	SNP2	Gene2	Interaction effect ALL pairs		Interaction effect CC pairs		Interaction effect CS pairs		Interaction effect Men-Men pairs		Interaction effect Women-Women pairs		Interaction effect Age at onset<Q2 pairs		Interaction effect Age at onset>Q2 pairs	
				Coefficient	P value	Coefficient	P value	Coefficient	P value	Coefficient	P value	Coefficient	P value	Coefficient	P value	Coefficient	P value
rs16940758	MAPT	rs2583959	SNCA	0.4078	0.0049	0.5407	0.0130	0.3670	0.0711	0.4498	0.0232	0.3029	0.2301	0.1994	0.3374	0.6527	0.0015
rs2435211	MAPT	rs3775423	SNCA	-0.5097	0.0105	-0.4278	0.1376	-0.6183	0.0297	-0.6325	0.0316	-0.4171	0.2245	-0.5997	0.0309	-0.4267	0.1444
rs17484286	LRRK2	rs3775423	SNCA	0.8451	0.0117	0.5523	0.2240	1.2590	0.0225	0.6386	0.1983	0.8728	0.0878	0.5249	0.2524	1.1153	0.0271
rs17484286	LRRK2	rs3775439	SNCA	0.6504	0.0192	0.5905	0.1110	0.9792	0.0349	0.2484	0.5468	1.0223	0.0167	0.8834	0.0268	0.3515	0.3866
rs8079215	MAPT	rs3775423	SNCA	0.4874	0.0214	0.1637	0.5722	0.9442	0.0036	0.4052	0.1746	0.3352	0.3642	0.7140	0.0263	0.2722	0.3346
rs17484286	LRRK2	REP1-263	SNCA	0.8516	0.0233	0.8403	0.1046	0.8527	0.1465	0.7089	0.2327	0.9017	0.0852	0.5963	0.2798	0.9723	0.0646
rs7307562	LRRK2	rs9995651	SNCA	-0.4774	0.0383	-0.8044	0.0220	-0.3406	0.2807	-0.9863	0.0038	0.0530	0.8943	-0.4200	0.2162	-0.4891	0.1219
rs17466521	LRRK2	rs2572324	SNCA	-0.2422	0.0416	0.0399	0.8107	-0.6114	0.0007	-0.1315	0.4062	-0.2134	0.3210	-0.3842	0.0239	-0.1314	0.4378
rs17484286	LRRK2	rs9995651	SNCA	0.9504	0.0445	0.7639	0.2952	1.1992	0.0683	1.5321	0.1385	0.9197	0.1185	0.7681	0.2929	0.9795	0.1256
rs10784486	LRRK2	rs2435211	MAPT	-0.2201	0.0490	-0.2530	0.1246	-0.2614	0.0978	-0.2915	0.0517	-0.0388	0.8548	-0.2016	0.1735	-0.2723	0.1151
rs17484286	LRRK2	rs2736990	SNCA	0.3460	0.0502	0.1210	0.6178	0.8878	0.0018	-0.0481	0.8457	0.5955	0.0429	0.8751	0.0014	-0.0730	0.7650
rs16940758	MAPT	rs2572324	SNCA	0.2838	0.0509	0.5163	0.0187	0.1327	0.5142	0.2634	0.1766	0.3135	0.2337	0.0654	0.7546	0.5209	0.0114
rs17466521	LRRK2	rs356218	SNCA	-0.2258	0.0513	0.0042	0.9796	-0.5077	0.0031	-0.1426	0.3507	-0.1595	0.4570	-0.4080	0.0133	-0.0729	0.6613
rs10784486	LRRK2	rs9995651	SNCA	0.4654	0.0562	0.7733	0.0274	0.1578	0.6542	0.8432	0.0194	0.3909	0.3662	0.1959	0.5916	0.7018	0.0347
rs6581668	LRRK2	rs2435211	MAPT	-0.1909	0.0654	-0.2305	0.1477	-0.1889	0.1802	-0.3592	0.0130	0.0070	0.9711	-0.0606	0.6714	-0.3331	0.0297
rs6581668	LRRK2	REP1-259	SNCA	0.1908	0.0661	0.1145	0.4424	0.3027	0.0450	0.2013	0.1455	0.2270	0.2430	0.3685	0.0206	0.0763	0.5847
rs7307562	LRRK2	rs3775423	SNCA	-0.3173	0.0783	-0.2659	0.3189	-0.4330	0.0884	-0.4503	0.0701	0.0059	0.9856	-0.1978	0.4339	-0.4137	0.1092
rs7307562	LRRK2	rs878918	MAPT	-0.1761	0.0845	-0.1570	0.3271	-0.2175	0.1145	-0.0462	0.7506	-0.3211	0.0907	-0.1232	0.4011	-0.2175	0.1268
rs878918	MAPT	rs356218	SNCA	-0.1843	0.0857	-0.1547	0.3284	-0.2482	0.1011	0.0146	0.9212	-0.3137	0.1122	-0.3447	0.0274	-0.0630	0.6721
rs10784486	LRRK2	rs3775423	SNCA	0.3131	0.0906	0.4248	0.1019	0.1881	0.4911	0.3369	0.1817	0.3787	0.2778	0.0428	0.8664	0.6335	0.0225
rs17466521	LRRK2	rs2583959	SNCA	-0.2002	0.0923	0.1358	0.4301	-0.5339	0.0020	-0.1429	0.3621	-0.0954	0.6727	-0.3278	0.0536	-0.0972	0.5676
rs11175922	LRRK2	rs16940806	MAPT	-0.2127	0.0941	-0.1943	0.2866	-0.2472	0.1839	-0.1419	0.4139	-0.4219	0.0700	-0.1982	0.2766	-0.1951	0.2755
rs11175922	LRRK2	MAPT H1/H2	MAPT	-0.2136	0.0951	-0.2383	0.2013	-0.2183	0.2372	-0.1314	0.4486	-0.4384	0.0649	-0.2163	0.2439	-0.1821	0.3073
rs878918	MAPT	rs2572324	SNCA	-0.1838	0.0992	-0.1847	0.2661	-0.2199	0.1598	-0.0300	0.8460	-0.2190	0.2850	-0.4009	0.0152	-0.0200	0.8965
rs10784486	LRRK2	MAPT H1/H2	MAPT	0.2192	0.1036	0.2811	0.1758	0.1851	0.3133	0.2030	0.2652	0.1636	0.5135	0.1090	0.5558	0.3455	0.0827
rs7307562	LRRK2	rs3775439	SNCA	-0.2340	0.1057	-0.2624	0.2073	-0.3519	0.0983	-0.2542	0.1908	0.0120	0.9661	-0.4726	0.0320	-0.0408	0.8331
rs6581668	LRRK2	rs1372520	SNCA	0.1898	0.1098	0.1241	0.4765	0.2517	0.1338	0.3345	0.0346	0.0443	0.8455	0.2772	0.1324	0.1701	0.2827
rs16940758	MAPT	rs356218	SNCA	0.2256	0.1127	0.4843	0.0238	0.0122	0.9514	0.2486	0.1944	0.2331	0.3549	-0.0313	0.8764	0.5196	0.0113
rs7307562	LRRK2	rs2435211	MAPT	0.1730	0.1168	0.2273	0.1702	0.2051	0.1835	0.1221	0.4258	0.2714	0.1565	0.1353	0.3576	0.2256	0.1860
rs10784486	LRRK2	rs878918	MAPT	0.1707	0.1232	0.2305	0.1767	0.1487	0.3263	0.1982	0.1953	0.0628	0.7628	0.1693	0.2694	0.1693	0.2979
rs6581668	LRRK2	rs3775423	SNCA	0.2694	0.1257	0.3477	0.1694	0.2392	0.3441	0.1867	0.4500	0.6300	0.0449	0.1359	0.5771	0.4151	0.1085
rs6581668	LRRK2	REP1 score	SNCA	-0.1294	0.1276	-0.0329	0.7920	-0.2419	0.0464	-0.1222	0.2841	-0.1098	0.4768	-0.2462	0.0538	-0.0467	0.6910
rs1491939	LRRK2	rs4792891	MAPT	0.3301	0.1286	0.4122	0.2300	0.1404	0.6363	0.6770	0.0309	-0.3397	0.4116	0.3117	0.3071	0.4469	0.1725
rs6581668	LRRK2	rs356186	SNCA	0.1948	0.1306	0.0311	0.8747	0.3224	0.0682	0.3706	0.0367	-0.0631	0.7892	0.2363	0.2296	0.1774	0.3073
rs8079215	MAPT	rs9995651	SNCA	0.4212	0.1333	0.1373	0.7491	0.6413	0.0937	-0.0099	0.9800	0.9085	0.0822	0.3147	0.4646	0.4503	0.2282
rs878918	MAPT	rs3775439	SNCA	0.2329	0.1414	0.3285	0.1576	0.2731	0.2255	0.0165	0.9396	0.4223	0.1501	0.0025	0.9915	0.4448	0.0393
rs10784486	LRRK2	rs16940806	MAPT	0.1975	0.1421	0.2725	0.1862	0.1445	0.4338	0.1718	0.3462	0.1816	0.4663	0.0588	0.7495	0.3611	0.0704
rs17466521	LRRK2	rs2736990	SNCA	-0.1650	0.1439	-0.0460	0.7677	-0.3456	0.0464	-0.0553	0.7052	-0.2447	0.2447	-0.3480	0.0295	-0.0114	0.9442
rs2435211	MAPT	rs9995651	SNCA	-0.3795	0.1440	-0.1128	0.7806	-0.4966	0.1531	-0.4155	0.3010	-0.7051	0.1201	-0.4507	0.1894	-0.2686	0.5127
rs878918	MAPT	rs3775423	SNCA	0.2761	0.1507	0.2941	0.2820	0.3765	0.1775	0.1134	0.6643	0.3562	0.2949	0.1279	0.6414	0.4405	0.1049
rs10784486	LRRK2	rs4792891	MAPT	0.1596	0.1676	0.1588	0.3528	0.1425	0.3810	-0.0479	0.7645	0.3137	0.1346	0.0134	0.9318	0.3511	0.0491
rs8079215	MAPT	rs3775439	SNCA	0.2251	0.1719	0.0685	0.7699	0.4676	0.0511	0.0271	0.9079	0.3565	0.2425	0.4052	0.1104	0.0872	0.6908
rs6581668	LRRK2	rs2583959	SNCA	-0.1483	0.1743	-0.2725	0.0875	-0.0863	0.5806	-0.1708	0.2639	-0.2785	0.1679	-0.0808	0.6037	-0.2262	0.1488
rs6581668	LRRK2	rs2435200	MAPT	0.1302	0.1848	0.1226	0.4180	0.1381	0.2987	0.1858	0.1837	0.0345	0.8382	0.1134	0.3987	0.1883	0.1964
rs17466521	LRRK2	MAPT H1/H2	MAPT	-0.1824	0.1906	-0.0899	0.6563	-0.2927	0.1404	-0.1947	0.2890	0.1086	0.6878	0.1250	0.5245	-0.5029	0.0129
rs7307562	LRRK2	rs356218	SNCA	0.1428	0.1909	0.1892	0.2316	0.0718	0.6504	0.2032	0.1719	-0.0904	0.6500	0.1986	0.2134	0.0990	0.5115
rs6581668	LRRK2	rs4792891	MAPT	0.1350	0.1954	0.2058	0.1829	0.0726	0.6193	0.0444	0.7637	0.1254	0.4923	0.0589	0.6877	0.2406	0.1160

Supplemental Table 2: Tests of gene-gene interactions for pairs of SNPs in SNCA, MAPT and LRRK2 in the sample overall as well as in strata based on sex, type of control (sibling or unrelated) and age at onset of the case. Results are sorted by p-value for the interaction in the sample overall.

SNP1	Gene1	SNP2	Gene2	Interaction effect ALL pairs		Interaction effect CC pairs		Interaction effect CS pairs		Interaction effect Men-Men pairs		Interaction effect Women-Women pairs		Interaction effect Age at onset<Q2 pairs		Interaction effect Age at onset>Q2 pairs	
				Coefficient	P value	Coefficient	P value	Coefficient	P value	Coefficient	P value	Coefficient	P value	Coefficient	P value	Coefficient	P value
rs16940758	MAPT	rs3775423	SNCA	-0.2954	0.1956	-0.5914	0.0754	-0.0716	0.8263	-0.3513	0.2840	-0.2197	0.5577	-0.6276	0.0514	-0.0175	0.9581
rs2435211	MAPT	rs3775439	SNCA	-0.2038	0.2053	-0.1122	0.6077	-0.3371	0.1836	-0.2621	0.2312	-0.3032	0.3042	-0.3583	0.1098	-0.0711	0.7660
rs6581668	LRRK2	rs9995651	SNCA	0.2870	0.2099	0.5302	0.1284	0.0530	0.8656	0.4442	0.2114	0.7134	0.0665	0.1546	0.6505	0.3859	0.2185
rs7307562	LRRK2	rs2583959	SNCA	0.1361	0.2165	0.0732	0.6485	0.1767	0.2621	0.1348	0.3662	0.0702	0.7273	0.1407	0.3764	0.1345	0.3817
rs11175922	LRRK2	rs878918	MAPT	-0.1244	0.2225	-0.1857	0.2245	-0.0891	0.5316	-0.1709	0.2341	-0.0417	0.8213	-0.0890	0.5272	-0.1797	0.2278
rs2404835	LRRK2	rs356218	SNCA	0.1353	0.2257	0.0380	0.8135	0.1619	0.3235	0.1470	0.3244	-0.0897	0.6612	0.2514	0.1169	0.0148	0.9260
rs6581668	LRRK2	rs16940806	MAPT	0.1510	0.2277	0.2496	0.1974	0.0915	0.5937	0.0765	0.6608	0.2067	0.3609	0.0550	0.7579	0.2512	0.1579
rs2435211	MAPT	REP1-263	SNCA	-0.2588	0.2302	-0.1436	0.6693	-0.3540	0.2251	0.0149	0.9641	-0.6299	0.0895	-0.2149	0.4863	-0.3029	0.3280
rs11175922	LRRK2	rs2435211	MAPT	0.1240	0.2353	0.1935	0.2248	0.0702	0.6259	0.2828	0.0476	-0.0325	0.8672	-0.0016	0.9913	0.2790	0.0745
rs878918	MAPT	rs2583959	SNCA	-0.1307	0.2357	-0.1215	0.4664	-0.1652	0.2779	0.1114	0.4774	-0.3167	0.1127	-0.2162	0.1642	-0.0928	0.5602
rs2404835	LRRK2	rs356186	SNCA	0.1600	0.2396	0.0569	0.7644	0.2490	0.2205	0.3140	0.0817	-0.0617	0.8003	-0.0251	0.9031	0.3550	0.0586
rs16940758	MAPT	rs2736990	SNCA	0.1566	0.2440	0.3877	0.0492	0.0091	0.9630	0.1862	0.2935	0.1302	0.5900	-0.0965	0.6077	0.4551	0.0204
rs16940758	MAPT	REP1-259	SNCA	-0.1665	0.2453	-0.1998	0.3368	-0.1068	0.6060	-0.2290	0.2180	-0.2517	0.3412	-0.2478	0.2856	-0.1521	0.4148
rs17466521	LRRK2	rs16940806	MAPT	-0.1608	0.2467	-0.0606	0.7619	-0.2707	0.1742	-0.2220	0.2292	0.2231	0.3998	0.1671	0.3920	-0.4960	0.0137
rs2435200	MAPT	rs2583959	SNCA	-0.1229	0.2552	-0.1073	0.5114	-0.0714	0.6332	-0.2758	0.0687	0.0915	0.6314	0.1575	0.3047	-0.4223	0.0067
rs6581668	LRRK2	MAPT H1/H2	MAPT	0.1427	0.2572	0.2592	0.1882	0.0832	0.6265	0.0837	0.6316	0.1511	0.5080	0.0594	0.7425	0.2270	0.2013
rs17466521	LRRK2	rs8079215	MAPT	-0.1336	0.2652	-0.1496	0.3987	-0.0812	0.6311	-0.2017	0.2190	-0.0906	0.6725	-0.2514	0.1484	-0.0693	0.6798
rs17484286	LRRK2	rs2572324	SNCA	0.2049	0.2721	-0.0187	0.9416	0.5832	0.0458	-0.0558	0.8256	0.2714	0.4045	0.6432	0.0283	-0.0690	0.7843
rs10784486	LRRK2	rs3775439	SNCA	0.1672	0.2794	0.3839	0.0784	0.0134	0.9536	0.0248	0.9081	0.3751	0.1904	0.3213	0.1548	0.0216	0.9201
rs10784486	LRRK2	rs8079215	MAPT	0.1180	0.2846	0.1342	0.4259	0.1232	0.4132	0.2008	0.1965	-0.0721	0.7271	0.0976	0.5231	0.1533	0.3429
rs17484286	LRRK2	rs2583959	SNCA	0.2039	0.2852	0.0190	0.9434	0.4685	0.1020	0.0874	0.7416	0.0501	0.8736	0.6343	0.0263	-0.1507	0.5704
rs6581668	LRRK2	rs3775439	SNCA	0.1555	0.2854	0.2598	0.2069	0.1410	0.5112	-0.0187	0.9275	0.6011	0.0205	0.3328	0.1223	0.0028	0.9887
rs16940758	MAPT	REP1 score	SNCA	0.1273	0.2855	0.1282	0.4748	0.1011	0.5464	0.2578	0.1120	0.0576	0.7769	0.0131	0.9443	0.2194	0.1669
rs2435211	MAPT	rs356186	SNCA	0.1507	0.2860	-0.2973	0.1576	0.6280	0.0028	0.2425	0.1959	-0.2344	0.3544	0.3184	0.1292	-0.0150	0.9388
rs2404835	LRRK2	rs8079215	MAPT	-0.1188	0.2862	-0.0076	0.9635	-0.2665	0.0915	-0.0854	0.5759	-0.0566	0.7820	-0.2406	0.1204	-0.0309	0.8512
rs17466521	LRRK2	rs4792891	MAPT	-0.1270	0.2881	0.0595	0.7380	-0.3368	0.0466	-0.1552	0.3383	0.0772	0.7249	0.0304	0.8578	-0.3061	0.0804
rs11175922	LRRK2	rs4792891	MAPT	-0.1143	0.2910	-0.1237	0.4377	-0.0833	0.5860	0.0232	0.8782	-0.3488	0.0741	-0.1261	0.3987	-0.0691	0.6702
rs11175922	LRRK2	rs3775423	SNCA	-0.1817	0.2953	-0.1486	0.5363	-0.3212	0.2148	-0.2116	0.3776	-0.2133	0.4768	0.0433	0.8613	-0.3900	0.1162
rs2435211	MAPT	REP1 score	SNCA	-0.1010	0.2963	0.0740	0.6058	-0.2886	0.0407	-0.0537	0.6741	-0.0681	0.7074	-0.1038	0.4653	-0.0926	0.4932
rs8079215	MAPT	rs2736990	SNCA	0.1121	0.2988	-0.0488	0.7492	0.3173	0.0458	0.2227	0.1336	0.0001	0.9997	0.0572	0.7146	0.1686	0.2631
rs17466521	LRRK2	rs2435211	MAPT	0.1161	0.3052	0.0521	0.7567	0.1514	0.3418	0.1850	0.2240	-0.1478	0.4837	0.1236	0.4376	0.1503	0.3613
rs17484286	LRRK2	rs4792891	MAPT	0.1821	0.3155	0.0260	0.9235	0.3372	0.1984	0.0429	0.8768	-0.0009	0.9976	0.2818	0.2750	0.1064	0.6854
rs1491939	LRRK2	rs2435211	MAPT	-0.2307	0.3176	-0.5021	0.1698	-0.0313	0.9202	-0.0170	0.9596	-0.1375	0.7458	-0.2425	0.4804	-0.1914	0.5409
rs2404835	LRRK2	rs2736990	SNCA	0.1045	0.3192	-0.0392	0.7870	0.2203	0.1720	0.0578	0.6801	0.0882	0.6321	0.2338	0.1075	-0.0751	0.6298
rs17484286	LRRK2	rs16940806	MAPT	0.2080	0.3288	0.1675	0.5951	0.3259	0.2936	0.3256	0.3135	-0.0685	0.8443	0.3238	0.3032	0.1235	0.6737
rs16940758	MAPT	rs3775439	SNCA	-0.1829	0.3313	-0.2149	0.4282	-0.0672	0.8049	-0.0604	0.8189	-0.2867	0.3735	-0.3987	0.1416	-0.0214	0.9358
rs8079215	MAPT	REP1-263	SNCA	0.2167	0.3338	0.1274	0.7161	0.2424	0.4168	0.2201	0.4845	0.4101	0.3078	0.0069	0.9835	0.3215	0.2926
rs17484286	LRRK2	MAPT H1/H2	MAPT	0.2052	0.3345	0.1402	0.6582	0.3609	0.2408	0.3188	0.3246	-0.1065	0.7615	0.3751	0.2320	0.0692	0.8139
rs1491939	LRRK2	rs3775423	SNCA	0.3204	0.3369	0.9423	0.0928	-0.0488	0.9131	1.8116	0.0336	0.2981	0.5664	0.2390	0.5792	0.6610	0.2590
rs2404835	LRRK2	rs878918	MAPT	-0.1055	0.3383	0.0242	0.8814	-0.2444	0.1193	-0.0493	0.7383	-0.2245	0.2750	-0.2730	0.0741	0.0782	0.6289
rs11175922	LRRK2	rs9995651	SNCA	-0.2156	0.3493	-0.3228	0.3278	-0.0977	0.7680	-0.5293	0.1202	-0.1791	0.6344	0.2130	0.5377	-0.5293	0.0979
rs1491939	LRRK2	rs8079215	MAPT	0.2022	0.3560	0.4785	0.1537	0.1073	0.7252	-0.2227	0.4692	0.5824	0.1648	0.0602	0.8533	0.2190	0.4677
rs10784486	LRRK2	rs2736990	SNCA	0.0988	0.3581	0.0287	0.8498	0.3004	0.0634	-0.0362	0.7980	0.3099	0.1349	0.3349	0.0341	-0.1053	0.4825
rs11175922	LRRK2	rs356186	SNCA	-0.1160	0.3722	-0.0424	0.8189	-0.1837	0.3386	-0.2810	0.1099	0.0155	0.9489	-0.1358	0.5152	-0.1108	0.5113
rs7307562	LRRK2	rs8079215	MAPT	-0.0912	0.3799	-0.1300	0.4081	-0.0935	0.5158	-0.0427	0.7710	-0.0518	0.7858	0.0201	0.8967	-0.1705	0.2254
rs16940758	MAPT	rs1372520	SNCA	-0.1368	0.3836	-0.0781	0.7359	-0.2184	0.3278	-0.2120	0.2912	-0.1686	0.5737	-0.2750	0.2975	-0.0809	0.6880
rs1491939	LRRK2	REP1-263	SNCA	-0.3052	0.3896	0.1641	0.7834	-0.6053	0.1992	0.6298	0.4090	-0.4442	0.3910	0.0826	0.8634	-0.7892	0.1608

Supplemental Table 2: Tests of gene-gene interactions for pairs of SNPs in SNCA, MAPT and LRRK2 in the sample overall as well as in strata based on sex, type of control (sibling or unrelated) and age at onset of the case. Results are sorted by p-value for the interaction in the sample overall.

SNP1	Gene1	SNP2	Gene2	Interaction effect ALL pairs		Interaction effect CC pairs		Interaction effect CS pairs		Interaction effect Men-Men pairs		Interaction effect Women-Women pairs		Interaction effect Age at onset<Q2 pairs		Interaction effect Age at onset>Q2 pairs	
				Coefficient	P value	Coefficient	P value	Coefficient	P value	Coefficient	P value	Coefficient	P value	Coefficient	P value	Coefficient	P value
rs16940806	MAPT	rs2583959	SNCA	-0.1127	0.3919	-0.2361	0.2254	0.0295	0.8745	-0.2643	0.1346	0.1000	0.6947	0.1086	0.5805	-0.3172	0.0772
rs878918	MAPT	REP1-259	SNCA	0.1011	0.3975	0.0069	0.9676	0.2664	0.1352	-0.1137	0.4636	0.3380	0.1439	-0.0041	0.9818	0.2097	0.2019
rs17484286	LRRK2	rs356218	SNCA	0.1511	0.4010	-0.0710	0.7833	0.5004	0.0609	-0.1096	0.6556	0.2799	0.3750	0.5190	0.0585	-0.0938	0.7034
rs6581668	LRRK2	rs878918	MAPT	0.0832	0.4040	0.0975	0.5187	0.0962	0.4848	0.0654	0.6376	0.0788	0.6681	-0.0453	0.7436	0.1852	0.2031
rs6581668	LRRK2	rs2736990	SNCA	0.0854	0.4084	-0.0415	0.7717	0.2470	0.1174	-0.0347	0.7976	0.3168	0.1057	0.3075	0.0365	-0.1474	0.3200
MAPT H1/H2	MAPT	rs2583959	SNCA	-0.1095	0.4090	-0.2224	0.2593	0.0227	0.9036	-0.2406	0.1769	0.0680	0.7915	0.0621	0.7516	-0.2723	0.1346
rs17484286	LRRK2	rs356186	SNCA	0.1948	0.4103	-0.0339	0.9168	0.3926	0.2910	0.4008	0.2260	-0.2688	0.5190	0.1651	0.6317	-0.2715	0.4134
rs4792891	MAPT	rs9995651	SNCA	0.1936	0.4106	0.0090	0.9808	0.2847	0.3584	0.4537	0.2297	0.2638	0.5033	0.4575	0.1860	-0.0572	0.8618
rs1491939	LRRK2	rs9995651	SNCA	0.3685	0.4289	1.7264	0.0881	-0.0974	0.8618	16.8370	0.0480	0.2605	0.7220	0.3932	0.5111	0.4365	0.5757
rs7307562	LRRK2	rs1372520	SNCA	-0.0999	0.4368	0.0152	0.9354	-0.1683	0.3564	-0.0593	0.7390	-0.0679	0.7653	-0.0653	0.7404	-0.1226	0.4734
rs10784486	LRRK2	rs2572324	SNCA	0.0895	0.4371	-0.0704	0.6604	-0.3465	0.0489	0.0239	0.8771	0.2319	0.3000	0.3380	0.0521	-0.1052	0.5049
rs11175922	LRRK2	rs2736990	SNCA	-0.0774	0.4390	-0.0327	0.8117	-0.1690	0.2676	-0.0359	0.7892	-0.0728	0.6851	-0.3099	0.0307	0.1703	0.2329
rs1491939	LRRK2	rs3775439	SNCA	0.2242	0.4421	0.4145	0.3311	0.2319	0.5757	0.2867	0.5613	0.4013	0.3990	0.2832	0.4688	0.1660	0.7150
rs11175922	LRRK2	rs8079215	MAPT	-0.0778	0.4541	-0.1740	0.2518	0.0224	0.8811	-0.1475	0.3136	-0.0338	0.8583	-0.0394	0.7868	-0.1243	0.4056
rs16940758	MAPT	rs356186	SNCA	-0.1189	0.4623	-0.1196	0.6238	-0.1531	0.4956	-0.2157	0.2996	-0.1136	0.7166	-0.2299	0.4022	-0.0993	0.6281
rs2435211	MAPT	rs1372520	SNCA	0.0941	0.4836	-0.1869	0.3418	0.4447	0.0272	0.1691	0.3363	-0.1651	0.4966	0.2296	0.2488	-0.0174	0.9256
rs2435211	MAPT	REP1-259	SNCA	0.0833	0.4847	-0.1249	0.4608	0.3702	0.0432	0.0653	0.6668	-0.0682	0.7624	0.1044	0.5456	0.0612	0.7157
rs1491939	LRRK2	MAPT H1/H2	MAPT	0.1808	0.4955	0.2164	0.5853	0.0155	0.9671	0.3086	0.3962	-0.1994	0.6989	-0.0673	0.8677	0.4755	0.1925
MAPT H1/H2	MAPT	rs1372520	SNCA	0.1016	0.4956	0.2828	0.1900	-0.1323	0.5491	0.2562	0.2036	0.0396	0.8844	0.1456	0.5264	0.0548	0.7848
rs11175922	LRRK2	rs1372520	SNCA	-0.0825	0.4969	0.0057	0.9728	-0.1685	0.3586	-0.1662	0.3033	-0.0425	0.8534	-0.0964	0.6182	-0.0919	0.5634
MAPT H1/H2	MAPT	rs3775439	SNCA	-0.1285	0.4980	-0.1742	0.5179	-0.1750	0.5270	0.0151	0.9551	-0.1007	0.7656	-0.0313	0.9145	-0.2007	0.4279
rs10784486	LRRK2	rs16940758	MAPT	-0.0898	0.5014	-0.1969	0.3339	-0.0199	0.9135	-0.1221	0.5025	0.0434	0.8577	-0.0706	0.7232	-0.1355	0.4577
rs17484286	LRRK2	rs2435200	MAPT	0.1121	0.5018	-0.0756	0.7683	0.3255	0.1579	0.2977	0.1999	-0.2182	0.4420	0.0583	0.8110	0.1688	0.4699
rs11175922	LRRK2	rs2572324	SNCA	-0.0714	0.5026	0.0317	0.8294	-0.1542	0.3411	-0.0868	0.5435	0.0524	0.7930	-0.2678	0.0929	0.0962	0.5084
rs4792891	MAPT	REP1-259	SNCA	-0.0792	0.5077	0.0324	0.8543	-0.2908	0.0965	0.2286	0.1560	-0.3015	0.1763	-0.1526	0.3937	-0.0305	0.8539
rs2404835	LRRK2	rs2435200	MAPT	0.0688	0.5095	-0.0525	0.7333	0.1446	0.3285	0.2675	0.0705	-0.2511	0.1613	-0.0167	0.9117	0.1560	0.2872
rs10784486	LRRK2	rs1372520	SNCA	0.0867	0.5109	0.1214	0.5269	0.0553	0.7678	0.1622	0.3619	0.0481	0.8476	0.1676	0.3856	0.0404	0.8282
rs4792891	MAPT	rs3775423	SNCA	0.1204	0.5118	-0.0346	0.8967	0.2113	0.4199	0.3938	0.1415	0.0253	0.9367	0.1242	0.6460	0.1279	0.6199
rs2435200	MAPT	rs2736990	SNCA	-0.0654	0.5124	-0.0625	0.6614	-0.0451	0.7572	-0.1040	0.4377	0.0863	0.6364	0.1757	0.2214	-0.3110	0.0279
rs11175922	LRRK2	rs356218	SNCA	-0.0690	0.5132	0.0676	0.6465	-0.2192	0.1672	-0.0325	0.8210	0.0418	0.8316	-0.2745	0.0776	0.1246	0.3934
rs17484286	LRRK2	REP1-259	SNCA	0.1312	0.5147	0.0655	0.8047	0.2377	0.4702	0.1717	0.5597	0.0055	0.9866	0.3190	0.2878	-0.0089	0.9744
rs2435211	MAPT	rs2583959	SNCA	0.0733	0.5265	0.1138	0.4994	-0.0278	0.8673	-0.0161	0.9174	0.0451	0.8321	-0.1473	0.3466	0.3552	0.0437
MAPT H1/H2	MAPT	rs356186	SNCA	0.1007	0.5294	0.4931	0.0372	-0.3108	0.1837	0.2245	0.3117	0.1107	0.6973	0.1278	0.6026	0.0755	0.7257
rs4792891	MAPT	rs2572324	SNCA	0.0692	0.5398	0.1312	0.4283	0.0671	0.6771	-0.1175	0.4459	0.2479	0.2505	0.1143	0.4851	-0.0064	0.9681
rs4792891	MAPT	rs356218	SNCA	0.0667	0.5471	0.0064	0.9679	0.1621	0.3156	-0.1516	0.3208	0.2890	0.1596	0.1222	0.4408	-0.0076	0.9618
rs17484286	LRRK2	REP1 score	SNCA	0.1001	0.5502	0.1149	0.6065	0.0617	0.8181	0.0080	0.9740	0.2491	0.3493	-0.0747	0.7739	0.2028	0.3653
rs10784486	LRRK2	REP1-259	SNCA	0.0699	0.5528	0.1477	0.3861	0.0664	0.6960	0.0629	0.6909	0.0236	0.9177	0.2613	0.1398	-0.0717	0.6560
rs878918	MAPT	rs9995651	SNCA	0.1458	0.5628	0.2454	0.5213	0.1219	0.7249	-0.1093	0.7653	0.4028	0.3521	-0.1714	0.6480	0.4942	0.1524
rs2404835	LRRK2	rs2572324	SNCA	0.0646	0.5744	-0.0731	0.6540	0.1406	0.4135	0.0613	0.6874	-0.1206	0.5750	0.1144	0.5008	0.0194	0.9035
rs2435211	MAPT	rs2736990	SNCA	-0.0613	0.5790	0.0886	0.5714	-0.2833	0.0876	-0.1045	0.4763	-0.1488	0.4581	-0.2754	0.0711	0.1941	0.2359
rs2435200	MAPT	REP1-263	SNCA	0.0990	0.5805	0.0272	0.9168	0.1862	0.4670	-0.0144	0.9541	0.1875	0.5477	0.2605	0.3157	-0.0072	0.9770
rs16940806	MAPT	rs2572324	SNCA	0.0730	0.5850	0.0584	0.7722	0.1310	0.4834	-0.0687	0.6987	0.1950	0.4734	0.2479	0.2192	-0.1070	0.5544
rs2435200	MAPT	REP1 score	SNCA	0.0477	0.5867	-0.0731	0.5612	0.2294	0.0746	-0.0883	0.4594	0.0433	0.7855	0.1405	0.2937	-0.0155	0.8959
rs1491939	LRRK2	rs16940806	MAPT	0.1461	0.5880	0.2135	0.6090	-0.0545	0.8839	0.2630	0.4702	-0.1706	0.7552	-0.1424	0.7227	0.5363	0.1596
rs1491939	LRRK2	rs2435200	MAPT	0.1121	0.5884	0.1274	0.6818	0.0100	0.9727	0.3028	0.3080	-0.2646	0.5076	0.2296	0.4548	0.0818	0.7745
rs16940806	MAPT	rs356186	SNCA	0.0869	0.5884	0.4984	0.0345	-0.3665	0.1228	0.2459	0.2691	0.0683	0.8081	0.1032	0.6766	0.0802	0.7088
rs7307562	LRRK2	REP1-259	SNCA	-0.0623	0.5893	0.1023	0.5433	-0.2494	0.1352	0.0380	0.8097	0.0069	0.9735	-0.1102	0.5299	-0.0213	0.8906

Supplemental Table 2: Tests of gene-gene interactions for pairs of SNPs in SNCA, MAPT and LRRK2 in the sample overall as well as in strata based on sex, type of control (sibling or unrelated) and age at onset of the case. Results are sorted by p-value for the interaction in the sample overall.

SNP1	Gene1	SNP2	Gene2	Interaction effect ALL pairs		Interaction effect CC pairs		Interaction effect CS pairs		Interaction effect Men-Men pairs		Interaction effect Women-Women pairs		Interaction effect Age at onset<Q2 pairs		Interaction effect Age at onset>Q2 pairs	
				Coefficient	P value	Coefficient	P value	Coefficient	P value	Coefficient	P value	Coefficient	P value	Coefficient	P value	Coefficient	P value
rs878918	MAPT	rs2736990	SNCA	-0.0553	0.5905	0.0120	0.9359	-0.0768	0.6013	0.0301	0.8322	-0.0940	0.6045	-0.2863	0.0537	0.1516	0.2936
rs16940806	MAPT	rs1372520	SNCA	0.0793	0.5964	0.2644	0.2204	-0.1781	0.4268	0.2570	0.2048	0.0027	0.9921	0.1233	0.5946	0.0427	0.8319
rs17484286	LRRK2	rs2435211	MAPT	-0.0929	0.5985	0.0392	0.8783	-0.2141	0.3970	-0.5147	0.0620	0.5025	0.0831	0.0383	0.8726	-0.2597	0.3233
rs8079215	MAPT	rs1372520	SNCA	0.0706	0.6008	0.2089	0.2935	-0.0075	0.9685	-0.0677	0.7011	0.2999	0.2461	-0.0665	0.7469	0.2204	0.2352
rs2404835	LRRK2	rs16940806	MAPT	0.0699	0.6010	0.0746	0.7104	0.1559	0.4059	0.0056	0.9757	0.1746	0.4790	0.2160	0.2597	-0.0821	0.6652
rs2435211	MAPT	rs356218	SNCA	0.0578	0.6018	0.1616	0.3197	-0.0914	0.5662	0.0314	0.8314	-0.0148	0.9433	-0.0873	0.5631	0.2282	0.1709
rs6581668	LRRK2	rs2572324	SNCA	0.0547	0.6138	-0.1489	0.3425	0.1885	0.2303	0.0530	0.7236	0.0803	0.6937	0.1980	0.2098	-0.0742	0.6255
rs2404835	LRRK2	rs3775423	SNCA	0.0893	0.6155	-0.0224	0.9311	0.2130	0.3997	-0.0065	0.9811	0.2600	0.3699	0.0288	0.9057	0.1152	0.6639
rs1491939	LRRK2	rs2583959	SNCA	-0.1169	0.6156	-0.1990	0.5736	0.0143	0.9645	-0.0621	0.8468	-0.4347	0.2974	0.4085	0.2254	-0.6190	0.0625
rs878918	MAPT	REP1 score	SNCA	-0.0490	0.6156	0.0504	0.7236	-0.1734	0.2142	0.0637	0.6165	-0.1128	0.5498	-0.0453	0.7539	-0.0651	0.6306
rs17466521	LRRK2	rs3775439	SNCA	0.0825	0.6163	-0.2310	0.3572	0.4017	0.0830	0.2876	0.2380	-0.3350	0.2444	0.0685	0.7774	0.0861	0.7053
rs16940806	MAPT	rs356218	SNCA	0.0648	0.6174	-0.0490	0.7981	0.1795	0.3324	-0.0596	0.7326	0.2143	0.3899	0.2274	0.2418	-0.1065	0.5461
rs4792891	MAPT	REP1 score	SNCA	0.0462	0.6203	-0.0889	0.5319	0.2066	0.1169	-0.1284	0.3141	0.1635	0.3357	0.1299	0.3473	-0.0250	0.8507
rs2404835	LRRK2	rs2435211	MAPT	0.0552	0.6249	0.0526	0.7538	0.1327	0.4041	-0.1982	0.2142	0.3643	0.0688	0.2721	0.0837	-0.1503	0.3705
MAPT H1/H2	MAPT	rs356218	SNCA	0.0637	0.6264	-0.0461	0.8127	0.1745	0.3476	-0.0372	0.8323	0.1710	0.4985	0.1736	0.3744	-0.0602	0.7354
rs2435200	MAPT	REP1-259	SNCA	-0.0543	0.6274	0.1035	0.5168	-0.3207	0.0542	0.1391	0.3522	-0.0375	0.8546	-0.1361	0.4280	0.0095	0.9496
rs7307562	LRRK2	rs2572324	SNCA	0.0537	0.6307	0.0134	0.9325	0.1202	0.4659	0.0144	0.9241	-0.0746	0.7180	0.0131	0.9377	0.0830	0.5822
rs17466521	LRRK2	rs16940758	MAPT	0.0692	0.6395	0.3232	0.1411	-0.1424	0.5001	0.0718	0.7150	-0.0469	0.8567	0.1937	0.3728	-0.0431	0.8329
rs17484286	LRRK2	rs878918	MAPT	-0.0837	0.6409	0.0340	0.8988	-0.2149	0.3992	0.0962	0.7116	-0.6282	0.0422	-0.2902	0.2464	0.1741	0.5113
rs1491939	LRRK2	rs878918	MAPT	-0.1036	0.6417	0.0303	0.9322	-0.1596	0.5888	-0.2101	0.5287	-0.1107	0.7814	-0.3244	0.2983	-0.0147	0.9639
rs16940806	MAPT	rs9995651	SNCA	0.1290	0.6456	0.0690	0.8655	0.2648	0.5041	0.2891	0.4866	-0.0709	0.8804	0.6227	0.1575	-0.2158	0.5607
rs2435200	MAPT	rs3775423	SNCA	0.0777	0.6472	0.1192	0.6024	0.0080	0.9757	0.2508	0.3201	0.0391	0.8858	0.0993	0.6920	0.0880	0.7076
rs878918	MAPT	rs1372520	SNCA	0.0603	0.6515	0.0550	0.7751	0.0786	0.6814	-0.1284	0.4711	0.3779	0.1334	-0.0305	0.8790	0.1695	0.3541
rs16940806	MAPT	rs3775439	SNCA	-0.0858	0.6526	-0.0840	0.7557	-0.1702	0.5414	0.0586	0.8284	-0.0759	0.8234	-0.0435	0.8832	-0.1109	0.6605
MAPT H1/H2	MAPT	rs2572324	SNCA	0.0603	0.6542	0.0400	0.8444	0.1278	0.4959	-0.0567	0.7510	0.1129	0.6795	0.2023	0.3164	-0.0908	0.6197
rs8079215	MAPT	REP1-259	SNCA	0.0523	0.6576	0.0804	0.6326	0.0949	0.5861	-0.1138	0.4630	0.1760	0.4230	0.0570	0.7506	0.0504	0.7513
rs10784486	LRRK2	REP1-263	SNCA	0.0859	0.6602	0.4313	0.1339	-0.2670	0.3370	0.3189	0.2447	-0.0376	0.9090	-0.0273	0.9245	0.1916	0.4766
rs10784486	LRRK2	rs2435200	MAPT	0.0485	0.6656	0.1184	0.4911	0.0479	0.7543	0.0034	0.9821	0.1200	0.5592	0.0084	0.9559	0.1075	0.5223
rs16940806	MAPT	REP1-263	SNCA	0.1067	0.6695	-0.2930	0.4507	0.4390	0.1918	-0.0390	0.9150	-0.1109	0.7966	0.3604	0.3458	-0.0827	0.8068
rs17484286	LRRK2	rs1372520	SNCA	0.0928	0.6751	0.0256	0.9301	0.0584	0.8684	0.3619	0.2582	-0.3178	0.4028	0.0612	0.8513	0.1719	0.5733
rs2435200	MAPT	rs356218	SNCA	-0.0439	0.6759	-0.0391	0.8009	0.0446	0.7647	-0.2184	0.1333	0.1572	0.4104	0.2091	0.1673	-0.3158	0.0346
rs1491939	LRRK2	rs356218	SNCA	-0.0892	0.6799	-0.1591	0.6017	0.0380	0.9070	-0.0422	0.8774	-0.2932	0.5075	0.1819	0.5664	-0.3605	0.2302
rs1491939	LRRK2	rs16940758	MAPT	0.1101	0.6861	0.6235	0.1082	-0.0891	0.8199	0.3597	0.3923	0.3112	0.5150	0.2914	0.5315	0.0201	0.9530
rs1491939	LRRK2	rs1372520	SNCA	-0.0977	0.6948	-0.1469	0.7104	-0.2008	0.5487	0.0559	0.8736	-0.5134	0.2692	-0.8697	0.0286	0.4231	0.2153
rs17484286	LRRK2	rs8079215	MAPT	-0.0704	0.6988	-0.0316	0.9082	-0.1885	0.4568	0.0179	0.9459	-0.3746	0.2320	-0.1932	0.4463	0.0722	0.7866
rs1491939	LRRK2	REP1 score	SNCA	-0.0648	0.7005	0.0306	0.9054	-0.1434	0.5392	0.1123	0.6676	-0.0512	0.8541	0.3173	0.2221	-0.3553	0.1400
rs7307562	LRRK2	rs2435200	MAPT	-0.0386	0.7005	-0.0552	0.7061	-0.0580	0.6886	-0.0386	0.7876	-0.1458	0.3972	-0.0788	0.5803	-0.0147	0.9186
rs17484286	LRRK2	rs16940758	MAPT	-0.0860	0.7009	-0.2133	0.5130	0.0411	0.8996	0.0159	0.9605	0.0146	0.9687	-0.1795	0.6021	-0.1230	0.6837
rs11175922	LRRK2	rs16940758	MAPT	0.0456	0.7120	0.1522	0.4382	-0.0303	0.8536	-0.0150	0.9315	-0.1412	0.5239	-0.1367	0.4528	0.2343	0.1727
rs4792891	MAPT	REP1-263	SNCA	0.0721	0.7133	-0.1978	0.5519	0.2165	0.3889	0.1044	0.7070	0.0358	0.9199	0.2447	0.3815	-0.0984	0.7326
MAPT H1/H2	MAPT	REP1-263	SNCA	0.0902	0.7134	-0.4104	0.2816	0.4834	0.1453	-0.0969	0.7870	-0.0631	0.8800	0.4445	0.2395	-0.1677	0.6132
rs2404835	LRRK2	rs9995651	SNCA	-0.0826	0.7190	-0.4943	0.1884	0.1279	0.6701	-0.3407	0.3507	0.2656	0.4820	-0.1320	0.6787	-0.1145	0.7376
rs17466521	LRRK2	REP1-263	SNCA	-0.0747	0.7224	-0.5770	0.0995	0.3094	0.2557	0.0102	0.9739	-0.4369	0.2185	0.1658	0.5649	-0.4130	0.1928
rs1491939	LRRK2	rs2736990	SNCA	0.0715	0.7230	0.1256	0.6593	0.1664	0.5796	0.0988	0.7261	-0.0944	0.7996	0.2559	0.3738	-0.1324	0.6522
rs2404835	LRRK2	rs4792891	MAPT	0.0399	0.7271	0.0248	0.8831	0.1010	0.5311	0.0755	0.6328	-0.1390	0.5052	0.2217	0.1862	-0.1193	0.4583
rs8079215	MAPT	rs2572324	SNCA	-0.0392	0.7303	-0.1193	0.4578	0.0096	0.9541	0.1828	0.2543	-0.1184	0.5513	-0.2161	0.1991	0.1445	0.3611
MAPT H1/H2	MAPT	REP1-259	SNCA	-0.0459	0.7322	0.1239	0.5213	-0.3584	0.0777	0.1695	0.3451	-0.1127	0.6457	-0.1362	0.5153	0.0075	0.9665

Supplemental Table 2: Tests of gene-gene interactions for pairs of SNPs in SNCA, MAPT and LRRK2 in the sample overall as well as in strata based on sex, type of control (sibling or unrelated) and age at onset of the case. Results are sorted by p-value for the interaction in the sample overall.

SNP1	Gene1	SNP2	Gene2	Interaction effect		Interaction effect		Interaction effect		Interaction effect		Interaction effect		Interaction effect		Interaction effect	
				ALL pairs		CC pairs		CS pairs		Men-Men pairs		Women-Women pairs		Age at onset<Q2 pairs		Age at onset>Q2 pairs	
				Coefficient	P value	Coefficient	P value	Coefficient	P value	Coefficient	P value	Coefficient	P value	Coefficient	P value	Coefficient	P value
rs1491939	LRRK2	rs356186	SNCA	0.0886	0.7344	0.2491	0.5510	-0.1833	0.6010	0.2225	0.5534	-0.1732	0.7226	-0.5553	0.1729	0.6166	0.0962
rs7307562	LRRK2	rs2736990	SNCA	-0.0337	0.7391	-0.0484	0.7353	-0.0986	0.5165	0.0179	0.8939	-0.1755	0.3435	-0.0960	0.5129	0.0226	0.8725
rs11175922	LRRK2	REP1-263	SNCA	0.0607	0.7470	-0.1467	0.5985	0.2331	0.3765	-0.1084	0.6823	0.1736	0.5707	0.3331	0.2218	-0.1868	0.4852
rs4792891	MAPT	rs1372520	SNCA	0.0417	0.7505	0.1899	0.3297	-0.1305	0.4858	0.1518	0.3923	0.0195	0.9350	0.0946	0.6277	-0.0097	0.9579
rs11175922	LRRK2	rs2583959	SNCA	0.0330	0.7587	0.1386	0.3547	-0.0681	0.6698	0.0974	0.5164	0.1767	0.3688	-0.1475	0.3328	0.2325	0.1305
rs17466521	LRRK2	rs2435200	MAPT	0.0347	0.7630	0.0834	0.6238	-0.0276	0.8639	0.0492	0.7620	0.1859	0.3638	0.1453	0.3663	-0.0745	0.6576
rs4792891	MAPT	rs3775439	SNCA	-0.0470	0.7635	-0.1344	0.5418	-0.1104	0.6319	0.3335	0.1307	-0.1883	0.5100	-0.0318	0.8925	-0.0703	0.7407
rs16940806	MAPT	REP1-259	SNCA	-0.0402	0.7651	0.1413	0.4656	-0.3662	0.0737	0.1614	0.3705	-0.0901	0.7114	-0.1168	0.5759	0.0149	0.9343
rs4792891	MAPT	rs2583959	SNCA	-0.0321	0.7740	-0.0465	0.7791	-0.0001	0.9996	-0.2020	0.1838	0.1738	0.4063	0.0736	0.6480	-0.1358	0.3933
MAPT H1/H2	MAPT	rs9995651	SNCA	0.0785	0.7812	-0.0354	0.9320	0.2556	0.5187	0.1954	0.6319	-0.1113	0.8213	0.6753	0.1354	-0.3220	0.3834
rs17466521	LRRK2	rs9995651	SNCA	-0.0702	0.7868	-0.3503	0.4119	0.2404	0.4771	0.0270	0.9488	-0.4645	0.2804	0.1545	0.6704	-0.3716	0.3252
rs8079215	MAPT	rs2583959	SNCA	0.0305	0.7884	-0.0486	0.7725	0.0818	0.6091	0.2832	0.0822	-0.1637	0.4105	-0.0808	0.6159	0.1489	0.3657
rs7307562	LRRK2	REP1 score	SNCA	0.0247	0.7903	-0.1308	0.3385	0.1618	0.2233	-0.1103	0.3929	0.0775	0.6350	0.0109	0.9366	0.0387	0.7637
MAPT H1/H2	MAPT	rs2736990	SNCA	-0.0327	0.7906	-0.0980	0.5840	0.0018	0.9919	-0.0878	0.5912	0.0660	0.7740	0.0958	0.5949	-0.1840	0.2847
rs16940806	MAPT	rs3775423	SNCA	0.0596	0.7924	0.1345	0.6652	-0.0221	0.9486	0.1905	0.5535	0.1085	0.7792	0.0129	0.9714	0.0942	0.7535
rs17466521	LRRK2	rs356186	SNCA	-0.0385	0.7972	-0.1442	0.4942	0.0053	0.9812	-0.0824	0.6814	-0.1176	0.6722	-0.2385	0.3137	0.0776	0.6979
rs2404835	LRRK2	MAPT H1/H2	MAPT	0.0332	0.8032	0.0737	0.7157	0.0984	0.5958	-0.0426	0.8154	0.1359	0.5808	0.1737	0.3634	-0.1116	0.5561
rs4792891	MAPT	rs356186	SNCA	0.0347	0.8033	0.3795	0.0721	-0.2611	0.1825	0.1313	0.4890	0.1265	0.6189	0.1201	0.5581	-0.0348	0.8595
rs7307562	LRRK2	REP1-263	SNCA	-0.0471	0.8055	-0.2038	0.4801	0.0158	0.9521	-0.3459	0.1989	0.4642	0.1606	-0.1347	0.6134	0.0945	0.7350
rs2404835	LRRK2	rs2583959	SNCA	-0.0269	0.8121	-0.0560	0.7361	-0.0616	0.7022	0.0242	0.8753	-0.3408	0.0954	0.0682	0.6690	-0.1254	0.4434
rs7307562	LRRK2	rs16940758	MAPT	-0.0307	0.8122	-0.1329	0.4914	0.0556	0.7598	-0.0432	0.8078	0.0298	0.8947	-0.1539	0.4131	0.1129	0.5312
MAPT H1/H2	MAPT	REP1 score	SNCA	0.0248	0.8205	-0.1855	0.2485	0.3072	0.0560	-0.1500	0.3192	0.0306	0.8731	0.1583	0.3698	-0.0558	0.6985
rs2435200	MAPT	rs1372520	SNCA	-0.0281	0.8254	0.1488	0.4123	-0.2796	0.1357	0.0819	0.6307	0.0345	0.8825	-0.0875	0.6623	-0.0256	0.8814
rs8079215	MAPT	rs356218	SNCA	-0.0232	0.8310	-0.1027	0.5026	0.0198	0.9017	0.2023	0.1806	-0.1547	0.4259	-0.1589	0.3233	0.1241	0.4115
rs2404835	LRRK2	REP1-259	SNCA	0.0244	0.8332	-0.0711	0.6624	0.0902	0.6016	0.0799	0.6057	0.0814	0.6947	0.0532	0.7574	0.0143	0.9286
rs10784486	LRRK2	REP1 score	SNCA	-0.0196	0.8344	0.0232	0.8640	-0.1081	0.4247	0.0292	0.8157	0.0037	0.9833	-0.1764	0.2149	0.0982	0.4439
rs7307562	LRRK2	MAPT H1/H2	MAPT	-0.0257	0.8352	-0.1066	0.5485	0.0298	0.8683	0.0195	0.9086	-0.1515	0.4995	-0.1427	0.4352	0.0825	0.6261
rs16940806	MAPT	REP1 score	SNCA	0.0225	0.8375	-0.1811	0.2624	0.3026	0.0623	-0.1356	0.3718	0.0031	0.9869	0.1232	0.4830	-0.0482	0.7406
rs2404835	LRRK2	rs3775439	SNCA	0.0296	0.8465	-0.0488	0.8275	0.1282	0.5559	-0.0070	0.9760	0.2698	0.2941	0.0521	0.8043	-0.0260	0.9084
rs6581668	LRRK2	REP1-263	SNCA	-0.0357	0.8478	0.1683	0.5644	-0.1704	0.4915	0.0879	0.7440	0.0495	0.8699	-0.0670	0.7970	-0.0103	0.9695
rs7307562	LRRK2	rs16940806	MAPT	-0.0234	0.8485	-0.1205	0.4886	0.0483	0.7892	0.0700	0.6802	-0.2457	0.2632	-0.1251	0.4863	0.0679	0.6877
rs878918	MAPT	rs356186	SNCA	0.0267	0.8506	0.0133	0.9485	0.0608	0.7627	-0.1229	0.5188	0.3170	0.2236	-0.1040	0.6228	0.1924	0.3273
rs2404835	LRRK2	REP1-263	SNCA	0.0355	0.8523	-0.1067	0.7139	0.1467	0.5752	-0.1605	0.5919	0.1614	0.5861	-0.0723	0.7844	0.1144	0.6846
rs878918	MAPT	REP1-263	SNCA	0.0377	0.8532	0.2321	0.4591	-0.0683	0.8038	-0.0943	0.7390	0.4016	0.2653	-0.2149	0.4603	0.2966	0.3038
rs2404835	LRRK2	rs16940758	MAPT	-0.0257	0.8535	-0.1933	0.3684	0.1189	0.5309	0.0372	0.8489	0.2082	0.4032	0.1175	0.5666	-0.1905	0.3224
rs11175922	LRRK2	rs3775439	SNCA	-0.0269	0.8569	-0.1701	0.4132	0.0240	0.9148	-0.0418	0.8435	-0.1229	0.6360	-0.0996	0.6574	0.0564	0.7792
rs4792891	MAPT	rs2736990	SNCA	0.0184	0.8600	-0.0431	0.7651	0.0469	0.7675	-0.0341	0.8098	0.1878	0.3123	0.0963	0.5206	-0.0631	0.6731
rs2404835	LRRK2	rs1372520	SNCA	0.0225	0.8627	-0.0617	0.7290	0.0895	0.6480	0.1507	0.3828	-0.1311	0.5683	-0.0639	0.7524	0.1141	0.5104
rs10784486	LRRK2	rs356186	SNCA	0.0244	0.8642	-0.0486	0.8166	0.0948	0.6383	0.1139	0.5578	-0.1205	0.6568	0.2146	0.3100	-0.1498	0.4514
rs8079215	MAPT	rs356186	SNCA	0.0230	0.8726	0.1492	0.4818	-0.0448	0.8257	-0.0674	0.7229	0.2096	0.4252	-0.1200	0.5811	0.1960	0.3223
rs17466521	LRRK2	rs878918	MAPT	-0.0180	0.8730	-0.1340	0.4241	0.0985	0.5361	-0.1562	0.3009	0.1719	0.4186	-0.0535	0.7438	0.0048	0.9759
rs11175922	LRRK2	REP1 score	SNCA	0.0137	0.8768	-0.0609	0.6241	0.1141	0.3809	-0.0045	0.9695	0.0231	0.8841	0.1627	0.2183	-0.1098	0.3679
rs16940806	MAPT	rs2736990	SNCA	-0.0188	0.8783	-0.0760	0.6718	0.0099	0.9558	-0.1021	0.5320	0.1277	0.5786	0.1446	0.4235	-0.2013	0.2400
rs11175922	LRRK2	rs2435200	MAPT	-0.0158	0.8794	-0.0119	0.9385	-0.0154	0.9163	-0.0972	0.5124	0.0455	0.8000	0.1307	0.3659	-0.1803	0.2397
MAPT H1/H2	MAPT	rs3775423	SNCA	0.0317	0.8883	0.0282	0.9279	0.0327	0.9230	0.1280	0.6878	0.1220	0.7534	0.1062	0.7638	-0.0197	0.9477
rs6581668	LRRK2	rs8079215	MAPT	0.0141	0.8903	0.0550	0.7278	0.0020	0.9884	0.0795	0.5908	-0.0426	0.8157	-0.1684	0.2471	0.1512	0.3084
rs7307562	LRRK2	rs356186	SNCA	-0.0181	0.8917	0.1452	0.4562	-0.1191	0.5286	0.0302	0.8708	-0.0019	0.9937	0.0106	0.9580	-0.0073	0.9677

Supplemental Table 2: Tests of gene-gene interactions for pairs of SNPs in SNCA, MAPT and LRRK2 in the sample overall as well as in strata based on sex, type of control (sibling or unrelated) and age at onset of the case. Results are sorted by p-value for the interaction in the sample overall.

SNP1	Gene1	SNP2	Gene2	Interaction effect ALL pairs		Interaction effect CC pairs		Interaction effect CS pairs		Interaction effect Men-Men pairs		Interaction effect Women-Women pairs		Interaction effect Age at onset≤Q2 pairs		Interaction effect Age at onset>Q2 pairs	
				Coefficient	P value	Coefficient	P value	Coefficient	P value	Coefficient	P value	Coefficient	P value	Coefficient	P value	Coefficient	P value
rs6581668	LRRK2	rs356218	SNCA	-0.0143	0.8948	-0.2315	0.1354	0.1700	0.2795	-0.0493	0.7407	-0.0470	0.8167	0.1138	0.4595	-0.1509	0.3255
rs17466521	LRRK2	rs3775423	SNCA	-0.0245	0.9014	-0.4322	0.1456	0.3778	0.1685	0.0917	0.7560	-0.3298	0.3316	0.0692	0.8028	-0.1637	0.5673
rs7307562	LRRK2	rs4792891	MAPT	0.0132	0.9035	-0.1132	0.4696	0.1849	0.2441	0.2356	0.1332	-0.2212	0.2319	0.0411	0.7906	0.0030	0.9847
rs2435200	MAPT	rs9995651	SNCA	0.0236	0.9153	0.0483	0.8787	-0.0654	0.8385	0.2746	0.4047	0.0350	0.9258	0.1693	0.6175	-0.0714	0.8102
rs1491939	LRRK2	REP1-259	SNCA	-0.0231	0.9177	0.0008	0.9982	-0.0392	0.9004	-0.0709	0.8189	-0.2183	0.6040	-0.6776	0.0670	0.3175	0.2842
rs17466521	LRRK2	REP1 score	SNCA	-0.0101	0.9221	0.0966	0.5251	-0.0543	0.7101	0.0370	0.7906	-0.0219	0.9064	0.1881	0.2256	-0.1641	0.2473
rs8079215	MAPT	REP1 score	SNCA	0.0094	0.9260	-0.0386	0.7919	-0.0057	0.9688	0.1272	0.3448	-0.0454	0.8071	-0.0402	0.7941	0.0296	0.8258
rs10784486	LRRK2	rs2583959	SNCA	0.0106	0.9269	-0.1784	0.2801	0.2411	0.1556	-0.0607	0.6967	0.0085	0.9688	0.1616	0.3297	-0.1413	0.3914
rs11175922	LRRK2	REP1-259	SNCA	-0.0100	0.9275	0.0221	0.8870	-0.0775	0.6351	-0.0290	0.8447	-0.0106	0.9584	-0.1516	0.3649	0.0963	0.5172
rs2435211	MAPT	rs2572324	SNCA	0.0092	0.9359	0.0443	0.7859	-0.0940	0.5742	-0.0002	0.9990	-0.1999	0.3592	-0.1507	0.3416	0.1754	0.2956
rs17466521	LRRK2	REP1-259	SNCA	-0.0096	0.9407	-0.3086	0.0919	0.2615	0.1726	-0.0501	0.7668	-0.1589	0.5193	-0.1814	0.3575	0.1091	0.5325
rs1491939	LRRK2	rs2572324	SNCA	-0.0155	0.9446	0.0184	0.9535	0.0107	0.9745	0.1280	0.6595	-0.2623	0.5483	0.3068	0.3536	-0.2994	0.3286
rs10784486	LRRK2	rs356218	SNCA	-0.0049	0.9647	-0.2213	0.1583	0.3126	0.0591	-0.0949	0.5202	0.1071	0.6226	0.1526	0.3546	-0.1327	0.3808
rs16940758	MAPT	rs9995651	SNCA	-0.0101	0.9739	0.2179	0.6817	-0.0815	0.8350	0.1847	0.7027	0.0314	0.9488	-0.7207	0.1055	0.6430	0.1527
rs2404835	LRRK2	REP1 score	SNCA	-0.0030	0.9742	0.0260	0.8435	-0.0206	0.8778	-0.0846	0.5082	0.0035	0.9820	-0.0408	0.7638	0.0180	0.8884
rs16940758	MAPT	REP1-263	SNCA	0.0075	0.9766	-0.2023	0.6256	0.1043	0.7586	0.4932	0.2221	-0.3662	0.3593	-0.5923	0.1058	0.5542	0.1432
rs6581668	LRRK2	rs16940758	MAPT	-0.0034	0.9780	-0.1935	0.3225	0.1238	0.4542	-0.1882	0.2720	0.4121	0.0678	0.0904	0.6299	-0.1109	0.5048
rs2435200	MAPT	rs3775439	SNCA	-0.0039	0.9782	-0.0118	0.9536	-0.0839	0.6991	0.2336	0.2700	-0.0505	0.8378	0.0310	0.8861	-0.0035	0.9859
rs2435200	MAPT	rs356186	SNCA	-0.0033	0.9807	0.3522	0.0788	-0.3735	0.0526	0.0783	0.6734	0.1768	0.4648	-0.0316	0.8768	-0.0169	0.9279
rs2435200	MAPT	rs2572324	SNCA	-0.0010	0.9926	0.0522	0.7494	0.0372	0.8117	-0.1997	0.1889	0.2863	0.1592	0.3089	0.0599	-0.2926	0.0550
rs17466521	LRRK2	rs1372520	SNCA	-0.0007	0.9962	-0.1799	0.3674	0.1586	0.4568	-0.0781	0.6791	-0.1064	0.6895	-0.0763	0.7350	0.0370	0.8443

P-values are not corrected for multiple testing.