

Supplementary Table 1: Instrumental variables for positive results

SNP	effect	other_effec	other_beta.	exposur	beta.outcome	eaf.exposeaf.outcc	eaf.outcc
rs10026792	A	G	A	G	0.0108	0.000170318	0.290404
rs10129747	G	A	G	A	0.00936	0.000097	0.530254
rs10896126	G	A	G	A	-0.015	0.000183081	0.303582
rs11152349	A	G	A	G	0.00991	-0.0000848	0.302856
rs11632215	C	A	C	A	-0.0141	0.000300288	0.120179
rs11720884	G	A	G	A	0.0112	-0.0000734	0.250137
rs11772627	C	G	C	G	0.0183	0.000191766	0.18202
rs11811826	A	T	A	T	0.0132	-0.000028634	0.224231
rs12137234	T	C	T	C	0.0102	-0.0000767	0.303772
rs1582322	G	A	G	A	0.00994	0.0000573	0.604805
rs1622515	G	A	G	A	0.00992	0.00000896	0.484704
rs17175518	A	C	A	C	0.0115	0.000129384	0.232775
rs17184707	T	C	T	C	-0.0114381	0.000287483	0.212811
rs1797235	C	G	C	G	-0.01	0.00000164	0.374623
rs2328887	C	T	C	T	0.0189	-0.000389051	0.899467
rs261809	G	A	G	A	-0.00963	0.000131464	0.540636
rs3101339	C	A	C	A	0.0143	-0.000201981	0.603285
rs34162196	T	C	T	C	-0.0224	0.000166279	0.101001
rs3764002	T	C	T	C	0.0131	-0.00016516	0.261416
rs4140799	A	G	A	G	0.00946	-0.000212853	0.531856
rs4149513	A	G	A	G	0.0117	-0.000167949	0.493537
rs4269101	G	T	G	T	-0.0138	0.0000901	0.718948
rs429358	C	T	C	T	0.0199	-0.000137441	0.154208
rs57499472	C	T	C	T	0.00991	0.0000693	0.404131
rs62084586	C	T	C	T	0.0134	-0.00002	0.165729
rs72720396	G	A	G	A	0.0114	0.000075391	0.229157
rs746868	G	C	G	C	-0.0129	0.0000217	0.614662
rs75641275	C	A	C	A	-0.0142	0.000147522	0.143372
rs7582086	T	G	T	G	-0.00963	-0.0000584	0.468273
rs7808471	C	T	C	T	-0.0115	-0.0000497	0.322136
rs8081370	T	C	T	C	-0.0167	-0.000213155	0.910232
rs862227	G	A	G	A	-0.00916	-0.0000288	0.458327
rs893856	A	G	A	G	-0.0134	0.000179242	0.148988
rs9385269	T	C	T	C	0.0121	-0.0000742	0.524565
rs10061973	T	G	T	G	-0.0108521	0.000110987	0.5139
rs10076975	C	T	C	T	0.0112	-0.0000899	0.381413
rs114497213	T	G	T	G	0.0273	0.00000432	0.05481
rs11767283	G	A	G	A	0.0177	-0.0000429	0.221709
rs11859365	C	A	C	A	0.0226	-0.00000186	0.253765
rs1201289	G	T	G	T	-0.0107	-0.000133163	0.394525
rs12663865	A	G	A	G	0.0128	-0.000133735	0.758185
rs12896749	C	G	C	G	-0.0109641	-0.000153577	0.384721
rs12983532	T	C	T	C	-0.0133895	-0.00000171	0.251137
rs1361016	G	T	G	T	0.0149567	-0.000042	0.844853
rs17050031	T	C	T	C	-0.012	0.000219978	0.4801
rs1876245	C	T	C	T	0.0151	-0.000274613	0.431482
rs1951286	G	T	G	T	-0.0146	-0.000029	0.644911
rs2374424	G	A	G	A	-0.0114	0.000135753	0.601525
rs2827161	G	T	G	T	0.0107114	0.0000233	0.422842

rs28533540	A	G	A	G	0.0146	-0.0000397	0.534203	0.535099
rs28623270	T	A	T	A	-0.0178	0.0000263	0.14872	0.148909
rs2952140	T	C	T	C	-0.0106774	-0.000055777	0.482607	0.481946
rs303817	G	A	G	A	0.0136	-0.000177914	0.751146	0.752588
rs3124402	G	A	G	A	-0.022	0.0000861	0.733261	0.733399
rs34555420	T	G	T	G	-0.0238	0.000533665	0.097821	0.099245
rs35287743	T	G	T	G	-0.0282	-0.000172815	0.115869	0.116368
rs4002471	T	C	T	C	-0.0192	0.000235393	0.547362	0.54887
rs4278546	G	A	G	A	0.0126	-0.000015	0.441085	0.438985
rs45501495	T	C	T	C	0.0157	0.0000327	0.236013	0.235687
rs4869859	C	T	C	T	0.014	-0.000242584	0.449939	0.448643
rs4982738	A	G	A	G	0.0109	-0.0000696	0.582899	0.583874
rs510161	G	C	G	C	-0.0113	-0.000123439	0.31037	0.310019
rs552234	A	G	A	G	-0.0116	0.000149573	0.495449	0.495102
rs55930451	T	C	T	C	-0.0171	-0.00000855	0.108001	0.108681
rs55985303	A	G	A	G	0.013	0.0000331	0.241079	0.239921
rs59355765	T	C	T	C	-0.0163	0.000317579	0.160079	0.160289
rs6033437	A	C	A	C	0.0124683	-0.000221853	0.257329	0.255732
rs6089753	T	C	T	C	-0.0115	0.000246352	0.530967	0.531784
rs61882686	A	C	A	C	0.0197559	0.0000686	0.085234	0.085203
rs631490	C	G	C	G	-0.0151	-0.0000697	0.709106	0.710542
rs6465487	G	A	G	A	-0.0124	-0.0001193	0.399814	0.400112
rs703987	C	G	C	G	0.0111218	-0.0000723	0.615005	0.613616
rs7254235	G	A	G	A	-0.0106	-0.000181098	0.577254	0.578807
rs75887709	G	A	G	A	-0.0159106	0.000301152	0.13588	0.136966
rs7683782	G	C	G	C	0.0145	-0.00000606	0.833405	0.833774
rs790564	C	A	C	A	0.0147	0.000129233	0.722952	0.722403
rs905575	G	C	G	C	0.0139	0.0000253	0.82397	0.824566
rs9301837	A	C	A	C	-0.0157	-0.0000472	0.143273	0.142057
rs9597870	G	T	G	T	-0.0127	0.0000106	0.245844	0.246434
rs9606833	C	T	C	T	0.017	-0.0000589	0.243593	0.245025
rs973526	T	C	T	C	-0.0115	0.000222541	0.513307	0.514258
rs9841174	C	T	C	T	0.0148	-0.00015705	0.373913	0.373858
rs9889161	T	G	T	G	-0.0133	0.000174282	0.357929	0.358174
rs10505667	T	C	T	C	-0.0243	-0.0000893	0.436	0.440247
rs113524166	T	G	T	G	0.127	-0.000801037	0.01086	0.011062
rs113580100	G	A	G	A	0.0632	-0.000476763	0.04376	0.042504
rs11521361	A	T	A	T	0.0327	-0.000159528	0.206901	0.20413
rs11678849	A	T	A	T	0.0277	-0.0000988	0.309133	0.310693
rs144143483	C	A	C	A	0.115	0.000151904	0.013671	0.013858
rs149870452	C	T	C	T	-0.097	0.000435038	0.018477	0.018279
rs150992808	A	G	A	G	0.0668096	-0.000426526	0.037124	0.03776
rs2819017	T	C	T	C	0.0417	-0.000132533	0.098369	0.096973
rs28614087	A	C	A	C	0.0245	0.0000811	0.447425	0.443756
rs3741434	C	T	C	T	-0.0355	0.0000744	0.140872	0.141999
rs392542	A	G	A	G	0.0274	-0.0000688	0.657947	0.660261
rs7157038	C	T	C	T	0.0261	-0.000138973	0.321506	0.32195
rs10959890	C	T	C	T	-0.0127	-0.000115086	0.212297	0.213475
rs1105388	T	C	T	C	-0.0114	0.000201678	0.300147	0.300585
rs11165829	G	C	G	C	-0.0102	-0.000111739	0.35997	0.360302
rs11878917	A	G	A	G	0.015	-0.0000835	0.109688	0.109267

rs1470610	C	G	C	G	-0.0122159	-0.000236572	0.196185	0.195757
rs429358	C	T	C	T	-0.0149	-0.000137441	0.154226	0.154996
rs4676964	T	C	T	C	0.0134	0.000171875	0.510605	0.511329
rs62169335	T	C	T	C	-0.00969	-0.0000949	0.543241	0.54437
rs7791463	A	G	A	G	0.00955	-0.0000592	0.534781	0.534761
rs784251	T	C	T	C	-0.0103	-0.000308228	0.477649	0.476705
rs79809011	A	G	A	G	-0.0281	-0.000368811	0.029465	0.029313
rs10822159	T	C	T	C	-0.0119	0.000133708	0.417863	0.416599
rs12046000	T	G	T	G	-0.0136	-0.0000641	0.447325	0.446824
rs12135360	T	G	T	G	-0.00975357	-0.000115555	0.563024	0.564507
rs1229984	C	T	C	T	0.0482	0.000241505	0.976527	0.975853
rs12513581	C	T	C	T	-0.011	-0.000050776	0.479763	0.479598
rs13130794	C	T	C	T	-0.012	-0.000206319	0.368294	0.37091
rs1387695	G	T	G	T	0.00996	0.000245625	0.574976	0.574086
rs143223375	G	C	G	C	-0.0266	0.0000289	0.035331	0.035439
rs28478711	G	A	G	A	-0.00953	-0.000115333	0.475331	0.477117
rs2883059	C	T	C	T	0.0117	0.000217948	0.425071	0.427659
rs34178057	C	A	C	A	0.0165	0.000444207	0.099089	0.098124
rs57994172	A	T	A	T	-0.0146	0.0000465	0.125767	0.125384
rs75413320	C	T	C	T	0.0165527	0.000113164	0.108113	0.109272
rs7851830	G	A	G	A	-0.0133	0.000112664	0.234411	0.235119
rs8044722	T	G	T	G	-0.01	-0.000140121	0.378845	0.377865

se. exposure	se. outcome	pval. outcop	pval. exposure	r2	F
0.0018423	0.000127501	0.18	3.9E-09	0.0000485	20.45085623
0.00168126	0.000116375	0.41	0.000000026	0.0000436	18.40450703
0.00181919	0.00012603	0.15	1.6E-16	0.0000953	40.17800183
0.0018176	0.000125883	0.5	0.000000049	0.0000415	17.49886454
0.00258382	0.000178948	0.0929994	0.000000044	0.0000423	17.84211661
0.00193554	0.000134091	0.59	7.6E-09	0.0000469	19.7759779
0.00217099	0.000150629	0.2	3E-17	0.000100091	42.21897536
0.0020058	0.000138912	0.84	4.4E-11	0.0000608	25.63718097
0.00183744	0.000127257	0.54	0.000000028	0.0000441	18.5801977
0.00171571	0.000118803	0.630001	6.8E-09	0.0000473	19.93516556
0.00167077	0.000115789	0.94	2.9E-09	0.0000491	20.72189284
0.00197514	0.00013671	0.34	5.9E-09	0.0000472	19.91065962
0.00204011	0.000141054	0.0420001	0.000000021	0.0000438	18.4883157
0.00174235	0.000120706	0.99	8.9E-09	0.000047	19.84456907
0.00277607	0.000191798	0.0430002	8.8E-12	0.0000649	27.38769239
0.00167902	0.000116414	0.26	9.8E-09	0.000046	19.42244262
0.00170546	0.000118124	0.0879995	6.2E-17	0.0000973	41.05343102
0.00277168	0.000191979	0.39	7.1E-16	0.0000908	38.30664603
0.00190081	0.000131517	0.21	5.1E-12	0.0000665	28.04305663
0.00167846	0.000116192	0.0669993	0.000000018	0.0000445	18.78280058
0.00167139	0.000115777	0.15	2.2E-12	0.0000688	29.012876
0.00185921	0.000128861	0.48	1.1E-13	0.0000771	32.50844113
0.00231362	0.000159861	0.39	6.7E-18	0.000103764	43.76826127
0.00171869	0.000118939	0.56	8.1E-09	0.0000473	19.95908852
0.00226174	0.00015606	0.9	3.2E-09	0.0000496	20.92590001
0.00198541	0.000137314	0.59	8.7E-09	0.0000461	19.4555264
0.00171452	0.000118812	0.86	5.2E-14	0.0000789	33.27818129
0.00238518	0.000164924	0.37	2.9E-09	0.0000493	20.77694515
0.00167381	0.000115959	0.61	8.8E-09	0.0000462	19.47136655
0.00178604	0.00012363	0.69	1.1E-10	0.0000581	24.51489691
0.00293795	0.00020361	0.29	0.000000014	0.0000454	19.14629879
0.00167238	0.000115838	0.81	0.000000043	0.0000417	17.58956969
0.00234923	0.00016276	0.27	0.000000013	0.0000453	19.0933444
0.00168183	0.000116509	0.52	7.2E-13	0.0000726	30.6365367
0.00191598	0.000115889	0.34	0.000000015	0.0000588	27.09326538
0.0019672	0.000118956	0.450001	0.000000011	0.0000596	27.44810764
0.00423605	0.00025772	0.99	1.1E-10	0.0000773	35.6170025
0.00231943	0.000140378	0.760001	2.5E-14	0.000107795	49.63879858
0.00219679	0.000132855	0.99	9.4E-25	0.000192877	88.82575424
0.0019595	0.000118542	0.26	0.000000044	0.000055	25.3113131
0.00223239	0.000135016	0.32	0.000000011	0.0000598	27.54268066
0.00196607	0.0001189	0.2	0.000000025	0.0000569	26.20551277
0.00223333	0.000135089	0.99	0.000000002	0.0000674	31.05096241
0.00265295	0.0001602	0.8	0.000000017	0.0000586	27.00384161
0.0019207	0.000116217	0.0589997	3.5E-10	0.0000725	33.37362726
0.00193122	0.000116852	0.0189998	5E-15	0.000112104	51.62318961
0.00199948	0.000120834	0.81	3E-13	0.0000974	44.85335275
0.00195609	0.000118287	0.25	4.9E-09	0.0000628	28.90805944
0.00193719	0.000117189	0.84	0.000000032	0.000056	25.78657242

0.00192478	0.000116411	0.73	2.8E-14	0.000106694	49.13150527
0.00273746	0.000165415	0.88	7.3E-11	0.0000805	37.07830223
0.00191504	0.000115779	0.630001	0.000000025	0.0000569	26.21645115
0.00220965	0.00013393	0.18	8E-10	0.0000689	31.74651487
0.00215651	0.000130464	0.51	1.9E-24	0.000189355	87.20310857
0.00321908	0.000193601	0.0059	1.5E-13	0.0000997	45.91374947
0.00301071	0.000181738	0.34	7E-21	0.000163166	75.14080201
0.0019244	0.000116486	0.0439997	1.5E-23	0.000183502	84.50755239
0.00193806	0.0001173	0.9	9.3E-11	0.0000777	35.79099898
0.00225713	0.000136632	0.81	3.7E-12	0.0000887	40.82941169
0.00192207	0.000116309	0.0369999	3.1E-13	0.0000972	44.7377917
0.00196936	0.000119122	0.56	0.000000035	0.0000574	26.41113522
0.00206615	0.000124996	0.32	0.000000045	0.0000547	25.1689512
0.00191252	0.000115677	0.2	1.1E-09	0.0000678	31.23168744
0.00307567	0.000185634	0.96	0.000000029	0.000056	25.80286258
0.00223629	0.000135537	0.81	6.6E-09	0.0000616	28.36053292
0.00260966	0.000157716	0.0439997	4.7E-10	0.000071	32.70634027
0.00220977	0.000133878	0.0969996	0.000000017	0.0000594	27.36084307
0.0019184	0.00011602	0.0340001	1.8E-09	0.0000664	30.55384505
0.0034254	0.000207218	0.74	0.000000008	0.0000609	28.02508509
0.00210253	0.00012739	0.59	6E-13	0.0000946	43.544294
0.00195628	0.00011829	0.31	2.7E-10	0.0000732	33.72560047
0.00197362	0.000119317	0.55	0.000000017	0.0000586	26.9720106
0.00194012	0.000117368	0.12	0.000000043	0.0000552	25.39648479
0.0028148	0.00016967	0.0759994	0.000000016	0.0000594	27.37363756
0.00257399	0.000155901	0.97	0.000000019	0.0000582	26.7999802
0.00214766	0.000129785	0.32	7.9E-12	0.0000865	39.80934956
0.00251917	0.000152627	0.87	0.000000036	0.0000559	25.74278092
0.00273045	0.000165744	0.77	8.1E-09	0.0000608	28.01568031
0.00223046	0.000134788	0.94	0.000000011	0.0000602	27.73472165
0.00223087	0.000134611	0.66	2.7E-14	0.000106319	48.95897184
0.00192962	0.000116736	0.0569994	2.5E-09	0.0000662	30.46416159
0.00198025	0.000119796	0.19	8.5E-14	0.000102252	47.08589685
0.0020015	0.000121007	0.15	2.8E-11	0.0000816	37.55210745
0.00536649	0.000116573	0.44	0.0000058	0.00029129	18.92394702
0.0279812	0.000598937	0.18	0.0000057	0.000346299	22.49888159
0.0134028	0.000296395	0.11	0.0000024	0.000334193	21.71207348
0.00657514	0.000144187	0.27	0.00000067	0.000350265	22.7566446
0.00597292	0.000129813	0.44	0.0000035	0.000327946	21.30608512
0.0251596	0.000544232	0.780001	0.0000046	0.000358592	23.29785557
0.0200442	0.000439502	0.32	0.0000013	0.000341393	22.1800396
0.014184	0.000306727	0.17	0.0000025	0.000319104	20.73149242
0.00891559	0.000195288	0.5	0.0000029	0.000308603	20.0489988
0.00539422	0.000117623	0.49	0.0000056	0.000296625	19.27061811
0.00760024	0.000165604	0.649999	0.000003	0.000305219	19.82910527
0.00559887	0.000122308	0.57	0.00000099	0.000337953	21.95647091
0.00569264	0.000123623	0.26	0.0000047	0.00029637	19.25403332
0.00209611	0.000141498	0.42	1.5E-09	0.0000537	24.73852916
0.00187563	0.000126848	0.11	1.3E-09	0.0000544	25.06552259
0.00177865	0.000120351	0.35	9.8E-09	0.0000479	22.10422451
0.00274812	0.000186143	0.649999	0.000000046	0.0000441	20.312535

0.00215779	0.000146149	0.11	0.000000015	0.0000471	21.70062528
0.00236847	0.000159861	0.39	3.6E-10	0.0000575	26.53081982
0.00172438	0.000116657	0.14	9.6E-15	0.0000891	41.09031508
0.00173523	0.000117403	0.42	0.000000024	0.0000466	21.46806379
0.00171063	0.000115738	0.61	0.000000024	0.0000454	20.91696864
0.00171651	0.000116087	0.0079001	1.7E-09	0.0000533	24.59264831
0.00508482	0.000344787	0.29	0.000000034	0.000045	20.76203088
0.00173385	0.000117415	0.25	6.4E-12	0.000069	22.61603364
0.00172363	0.000116608	0.58	2.5E-15	0.000092	30.13754949
0.00172435	0.000116759	0.32	0.000000015	0.0000468	15.33727984
0.00558483	0.000375999	0.52	6E-18	0.000106579	34.92233011
0.00171278	0.000115854	0.66	1.3E-10	0.0000604	19.7972982
0.00177878	0.00012027	0.0860003	1.7E-11	0.0000666	21.82193048
0.00173417	0.000117422	0.0359998	9.2E-09	0.0000485	15.89823137
0.00476237	0.000321681	0.93	0.000000024	0.0000481	15.7657755
0.0017265	0.000116748	0.32	0.000000034	0.0000453	14.85361985
0.00172733	0.000116848	0.0619998	1.3E-11	0.0000668	21.90315275
0.00286516	0.000194719	0.0230001	7.7E-09	0.0000489	16.01940569
0.00263074	0.000178127	0.79	0.000000028	0.0000469	15.37110421
0.00276055	0.000185758	0.54	0.000000002	0.0000528	17.31269577
0.00201723	0.000136383	0.41	4.5E-11	0.0000634	20.77116902
0.00176015	0.000119183	0.24	0.000000013	0.0000472	15.45999786