SUPPLEMENTARY DATA

Supplementary Table 1. The HDL SNPs and their associations in the LifeLines and PREVEND cohorts.

HDL SNPs						LifeLines			Prevend			Meta
Chr	NearbyGene	SNP	Position	RA	Effect Size	RAF	beta (SE)	P value	RAF	beta (SE)*	P value	P value#
16	CETP	rs3764261	55,550,825	A	0.088	0.32	0.095 (0.005)	3.68×10^{-79}	0.33	0.073 (0.011)	1.88×10^{-11}	**6.06×10^{-87}**
8	LPL	rs12678919	19,888,502	G	0.058	0.1	0.064 (0.008)	9.17×10^{-17}	0.1	0.064 (0.017)	2.1×10^{-4}	**1.04×10^{-18}**
18	LIPG	rs7241918	45,414,951	T	0.034	0.84	0.039 (0.006)	1.79×10^{-9}	0.85	0.011 (0.014)	0.438	**2.38×10^{-9}**
20	PLTP	rs6065906	43,987,422	T	0.024	0.8	0.026 (0.006)	1.30×10^{-5}	0.81	0.041 (0.014)	0.003	**1.20×10^{-6}**
2	APOB	rs1042034	21,078,786	C	0.023	0.21	0.026 (0.006)	8.14×10^{-6}	0.21	0.029 (0.013)	0.021	**1.53×10^{-6}**
19	APOE–C1–C2	rs4420638	50,114,786	A	0.027	0.86	0.03 (0.007)	3.91×10^{-5}	0.86	0.034 (0.015)	0.026	**8.04×10^{-6}**
1	PABPC4	rs4660293	39,800,767	A	0.012	0.75	0.023 (0.005)	1.76×10^{-5}	0.74	0.013 (0.012)	0.291	**1.14×10^{-5}**
11	LRP4	rs3136441	46,699,823	C	0.020	0.15	0.028 (0.007)	3.54×10^{-5}	0.15	0.023 (0.015)	0.126	**1.43×10^{-5}**
8	PPP1R3B	rs9987289	9,220,768	G	0.031	0.93	0.033 (0.009)	2.73×10^{-4}	0.92	-0.018 (0.019)	0.347	**7.29×10^{-4}**
11	FADS1–2–3	rs174601	61,379,716	C	0.019	0.78	0.02 (0.006)	8.25×10^{-4}	0.78	0.003 (0.013)	0.813	**8.16×10^{-4}**
9	TTC39B	rs643531	15,286,034	A	0.019	0.84	0.023 (0.006)	4.65×10^{-4}	0.85	-0.007 (0.014)	0.637	**8.19×10^{-4}**
4	SLC39A8	rs13107325	103,407,732	C	0.022	0.93	0.027 (0.009)	4.35×10^{-3}	0.93	0.029 (0.021)	0.162	**1.7×10^{-3}**
16	CMIP	rs2925979	80,092,291	C	0.012	0.65	0.015 (0.005)	4.47×10^{-3}	0.65	0.011 (0.011)	0.315	**2.26×10^{-3}**
1	ZNF648	rs1689800	180,435,508	A	0.012	0.68	0.015 (0.005)	4.79×10^{-3}	0.68	0.009 (0.011)	0.428	**2.76×10^{-3}**
2	IRS1	rs1515100	226,837,161	C	0.012	0.54	0.016 (0.005)	2.44×10^{-3}	0.53	-0.002 (0.011)	0.868	**2.79×10^{-3}**
8	TRIB1	rs10808546	126,565,000	T	0.016	0.46	0.013 (0.005)	6.99×10^{-3}	0.45	0.012 (0.01)	0.243	**3.09×10^{-3}**
12	SCARB1	rs838880	123,827,546	C	0.016	0.35	0.012 (0.005)	0.0179	0.34	0.022 (0.011)	0.043	**4.56×10^{-3}**
22	UBE2L3	rs181362	20,262,068	C	0.012	0.78	0.015 (0.006)	0.00984	0.79	0.012 (0.013)	0.367	**5.0×10^{-3}**
7	KLF14	rs4731702	130,083,924	T	0.015	0.49	0.013 (0.005)	0.00598	0.49	-0.005 (0.01)	0.664	**6.98×10^{-3}**
15	LIPC	rs1532085	56,470,658	A	0.038	0.3	0.015 (0.006)	0.0104	0.31	0.005 (0.013)	0.723	**7.18×10^{-3}**
17	STARD3	rs881844	35,063,744	G	0.013	0.72	0.012 (0.005)	0.031	0.7	0.019 (0.012)	0.098	**9.58×10^{-3}**
17	ABCA8	rs4148008	64,386,889	C	0.011	0.68	0.011 (0.005)	0.0291	0.68	0.016 (0.011)	0.173	0.0105
12	LRP1	rs3741414	56,130,316	T	0.012	0.24	0.01 (0.006)	0.0676	0.24	0.031 (0.012)	0.011	0.013
11	UBASH3B	rs7115089	122,035,801	G	0.008	0.37	0.01 (0.005)	0.0366	0.35	0.009 (0.011)	0.396	0.0168
12	SBNO1	rs4759375	122,362,191	T	0.022	0.06	0.017 (0.01)	0.0923	0.06	0.025 (0.023)	0.272	0.034
12	ZNF664	rs4765127	123,026,120	T	0.011	0.31	0.01 (0.005)	0.0516	0.33	-0.002 (0.011)	0.859	0.035
8	TRPS1	rs2293889	116,668,374	G	0.011	0.58	0.007 (0.005)	0.132	0.58	0.019 (0.011)	0.076	0.036
19	ANGPTL4	rs7255436	8,339,196	A	0.012	0.55	0.007 (0.005)	0.127	0.55	0.014 (0.01)	0.168	0.040

12	MVK	rs7134594	108,484,576	T	0.011	0.52	0.007 (0.005)	0.151	0.49	0.013 (0.01)	0.232	0.050
2	COBLL1	rs12328675	165,249,046	C	0.018	0.12	0.011 (0.007)	0.115	0.13	0.008 (0.016)	0.615	0.051
5	ARL15	rs6450176	53,333,782	G	0.013	0.74	0.009 (0.005)	0.103	0.73	0.002 (0.012)	0.868	0.053
19	LILRA3	rs386000	59,484,573	C	0.021	0.01	0.03 (0.021)	0.153	0.02	0.032 (0.043)	0.454	0.059
7	MLXIPL	rs17145738	72,620,810	T	0.015	0.13	0.01 (0.007)	0.141	0.12	0.009 (0.016)	0.590	0.060
6	LPA	rs1084651	161,009,807	G	0.015	0.85	0.008 (0.007)	0.223	0.85	0.017 (0.015)	0.230	0.070
12	PDE3A	rs7134375	20,365,025	A	0.010	0.4	0.008 (0.006)	0.174	0.41	-0.009 (0.013)	0.488	0.100
18	MC4R	rs12967135	56,000,003	G	0.011	0.75	0.006 (0.005)	0.279	0.76	0.003 (0.012)	0.808	0.108
6	CITED2	rs605066	139,871,359	T	0.010	0.55	0.01 (0.01)	0.314	0.53	0.014 (0.025)	0.578	0.108
9	ABCA1	rs1883025	106,704,122	C	0.024	0.75	0.006 (0.006)	0.367	0.74	0.011 (0.013)	0.429	0.115
17	PGS1	rs4082919	73,889,077	T	0.010	0.52	0.003 (0.005)	0.542	0.51	0.018 (0.011)	0.081	0.124
11	APOA1–C3–A4–A5	rs964184	116,154,127	C	0.039	0.98	0.015 (0.016)	0.374	0.98	0.001 (0.036)	0.974	0.136
11	AMPD3	rs2923084	10,345,358	A	0.011	0.83	-0.004 (0.006)	0.524	0.84	-0.011 (0.014)	0.457	0.147
16	LCAT	rs16942887	66,485,543	A	0.033	0.02	0.008 (0.019)	0.665	0.01	0.077 (0.05)	0.124	0.15
1	GALNT2	rs4846914	228,362,314	A	0.016	0.62	0.003 (0.007)	0.677	0.59	0.015 (0.011)	0.160	0.155
6	C6orf106	rs2814944	34,660,775	G	0.013	0.93	0.004 (0.009)	0.66	0.94	0.007 (0.022)	0.751	0.176
19	LOC55908	rs737337	11,208,493	T	0.017	0.999	0.045 (0.068)	0.509	0.999	-0.192 (0.147)	0.193	0.187
15	LACTB	rs2652834	61,183,920	G	0.010	0.84	-0.001 (0.007)	0.862	0.86	0.018 (0.016)	0.254	0.199

* Effect sizes (beta) and standard errors (SE) in s.d. units.
# P value in bold indicates the significance at P<0.01 level.

SUPPLEMENTARY DATA

Supplementary Table 2. The LDL SNPs and their associations in the LifeLines and PREVEND cohorts.

LDL SNPs						LifeLines			PREVEND			META
Chr	NearbyGene	SNP	Position	RA	Effect Size	RAF	beta (SE)*	P value	RAF	beta (SE)*	P value	P value#
19	APOE–C1–C2	rs4420638	50,114,786	G	0.184926	0.14	0.222 (0.017)	6.27×10^{-40}	0.14	0.158 (0.043)	2.77×10^{-4}	**3.55×10^{-42}**
19	LDLR	rs6511720	11,063,306	G	0.181041	0.92	0.174 (0.021)	9.28×10^{-17}	0.92	0.201 (0.057)	4.04×10^{-4}	**1.47×10^{-18}**
5	HMGCR	rs12916	74,692,295	C	0.063455	0.39	0.068 (0.011)	2.89×10^{-9}	0.41	0.072 (0.03)	0.0177	**4.50×10^{-10}**
2	APOB	rs1367117	21,117,405	A	0.104895	0.32	0.062 (0.012)	1.67×10^{-7}	0.32	0.052 (0.031)	0.0980	**6.47×10^{-08}**
1	LDLRAP1	rs12027135	25,648,320	T	0.02849	0.56	0.058 (0.011)	1.92×10^{-7}	0.56	0.015 (0.029)	0.600	**2.72×10^{-7}**
1	ANGPTL3	rs3850634	62,823,186	T	0.041181	0.65	0.056 (0.012)	9.90×10^{-7}	0.65	0.053 (0.031)	0.0916	**3.60×10^{-7}**
1	SORT1	rs629301	109,619,829	T	0.146335	0.71	0.066 (0.015)	1.63×10^{-5}	0.72	0.119 (0.04)	3.030×10^{-3}	**1.55×10^{-6}**
20	TOP1	rs909802	39,370,229	T	0.036519	0.43	0.038 (0.011)	6.19×10^{-4}	0.44	0.065 (0.03)	0.0292	**1.38×10^{-4}**
1	IRF2BP2	rs514230	232,925,220	T	0.029267	0.54	0.034 (0.011)	1.78×10^{-3}	0.53	0.077 (0.029)	7.75×10^{-3}	**2.77×10^{-4}**
8	CYP7A1	rs1030431	59,474,251	A	0.024605	0.33	0.039 (0.012)	8.64×10^{-4}	0.35	0.042 (0.03)	0.162	**3.59×10^{-4}**
5	TIMD4	rs6882076	156,322,875	C	0.043253	0.65	0.035 (0.012)	2.5×10^{-3}	0.75	0.093 (0.034)	6.68×10^{-3}	**3.80×10^{-4}**
1	PCSK9	rs2479409	55,277,238	G	0.052059	0.26	0.042 (0.013)	1.14×10^{-3}	0.25	0.042 (0.035)	0.229	**5.43×10^{-4}**
8	TRIB1	rs2954022	126,551,803	C	0.047656	0.52	0.035 (0.011)	1.5×10^{-3}	0.53	0.037 (0.029)	0.197	**6.62×10^{-4}**
8	PLEC1	rs11136341	145,115,531	G	0.03626	0.34	0.038 (0.012)	9.31×10^{-4}	0.35	-0.006 (0.031)	0.859	**1.22×10^{-3}**
11	FADS1–2–3	rs174583	61,366,326	C	0.044289	0.79	0.046 (0.014)	1.26×10^{-3}	0.78	-0.045 (0.038)	0.232	**3.07×10^{-3}**
2	ABCG5/8	rs4299376	43,926,080	G	0.071225	0.12	0.06 (0.018)	8.9×10^{-4}	0.13	-0.078 (0.047)	0.0969	**3.11×10^{-3}**
1	MOSC1	rs2807834	219,037,216	G	0.028231	0.78	0.043 (0.016)	5.32×10^{-3}	0.75	-0.043 (0.041)	0.296	**8.88×10^{-3}**
6	LPA	rs1564348	160,498,850	C	0.050505	0.07	0.045 (0.022)	0.0421	0.07	0.119 (0.059)	0.0446	0.0107
12	BRAP	rs11065987	110,556,807	A	0.025123	0.57	0.022 (0.011)	0.0569	0.56	0.019 (0.031)	0.535	0.0274
16	HPR	rs2000999	70,665,594	A	0.0518	0.41	0.022 (0.012)	0.0713	0.4	0.027 (0.032)	0.394	0.0301
6	FRK	rs11153594	116,461,284	C	0.023051	0.63	0.021 (0.011)	0.0655	0.63	-0.002 (0.031)	0.938	0.0408
10	GPAM	rs1129555	113,900,711	A	0.027972	0.27	0.018 (0.012)	0.154	0.28	0.046 (0.033)	0.170	0.048
6	MYLIP	rs3757354	16,235,386	C	0.037037	0.78	0.022 (0.013)	0.106	0.78	0.018 (0.036)	0.620	0.0481
11	ST3GAL4	rs11220462	125,749,162	A	0.050505	0.08	0.032 (0.02)	0.109	0.08	0.021 (0.055)	0.698	0.0512
6	HFE	rs1800562	26,201,120	G	0.057498	0.99	0.07 (0.061)	0.251	1	0.143 (0.509)	0.778	0.0992
9	ABO	rs649129	135,144,125	T	0.053095	0.08	0.021 (0.021)	0.329	0.07	0.009 (0.062)	0.883	0.123
11	APOA1–C3–A4–A5	rs964184	116,154,127	G	0.073815	0.02	0.039 (0.038)	0.308	0.02	-0.065 (0.103)	0.530	0.138
16	CETP	rs247616	55,547,091	C	0.037555	0.58	0.011 (0.021)	0.585	0.57	0.067 (0.057)	0.240	0.146
12	HNF1A	rs1169288	119,901,033	C	0.036778	0.33	0.008 (0.013)	0.503	0.31	0.009 (0.034)	0.790	0.155
19	CILP2	rs10401969	19,268,718	T	0.080549	1	-0.057 (0.088)	0.521	1	-0.025 (0.247)	0.920	0.162

6	HLA	rs3177928	32,520,413	A	0.047397	0.18	0.002 (0.014)	0.884	0.18	0.074 (0.039)	0.0602	0.172
7	DNAH11	rs12670798	21,573,877	C	0.032634	0.1	-0.01 (0.019)	0.581	0.1	0.016 (0.051)	0.749	0.179
7	NPC1L1	rs217386	44,567,220	G	0.030303	0.48	0.007 (0.026)	0.786	0.48	0.032 (0.069)	0.643	0.187
8	PPP1R3B	rs2126259	9,222,556	C	0.057498	0.99	0.004 (0.062)	0.944	1	-0.543 (0.294)	0.0649	0.189
17	OSBPL7	rs7225700	42,746,803	C	0.022533	0.61	0.003 (0.011)	0.809	0.6	-0.001 (0.03)	0.962	0.194
14	NYNRIN	rs2332328	23,952,898	T	0.030303	0.5	-0.02 (0.114)	0.859	0.5	0.205 (0.254)	0.420	0.199
20	MAFB	rs2902941	38,524,928	A	0.025382	0.72	-0.003 (0.013)	0.807	0.73	0.03 (0.035)	0.381	0.199

* Effect sizes (beta) and standard errors (SE) in s.d. units.
# P value in bold indicates the significance at P<0.01 level.

SUPPLEMENTARY DATA

Supplementary Table 3. The TG SNPs and their associations in the Lifelines and PREVEND cohorts.

TG SNPs						LifeLines			PREVEND			Meta
Chr	Near by Gene	SNP	Position	RA	Effect Size	RAF	beta (SE)*	P value	RAF	beta (SE)*	P value	P value#
2	GCKR	rs1260326	27,584,444	T	8.76	0.35	0.027 (0.003)	4.21×10^{-20}	0.37	0.024 (0.006)	1.49×10^{-4}	**3.20×10^{-22}**
8	LPL	rs12678919	19,888,502	A	13.6	0.9	0.038 (0.005)	9.90×10^{-17}	0.9	0.059 (0.01)	7.70×10^{-9}	**1.90×10^{-20}**
1	ANGPTL3	rs2131925	62,798,530	T	4.94	0.65	0.023 (0.003)	2.84×10^{-15}	0.65	0.014 (0.007)	0.0307	**5.97×10^{-16}**
19	APOE–C1–C2	rs439401	50,106,291	C	5.5	0.66	0.021 (0.003)	3.51×10^{-12}	0.66	0.029 (0.006)	5.30×10^{-6}	**1.48×10^{-14}**
8	TRIB1	rs2954029	126,560,154	A	5.64	0.55	0.017 (0.003)	4.02×10^{-9}	0.56	0.017 (0.006)	5.56×10^{-3}	**3.63×10^{-10}**
7	MLXIPL	rs7811265	72,572,446	A	7.91	0.87	0.024 (0.004)	7.01×10^{-9}	0.88	0.028 (0.009)	2.13×10^{-3}	**4.27×10^{-10}**
2	APOB	rs1042034	21,078,786	T	5.99	0.79	0.019 (0.003)	3.86×10^{-8}	0.79	0.022 (0.008)	3.81×10^{-3}	**3.17×10^{-9}**
15	LIPC	rs261342	56,518,445	G	2.99	0.22	0.018 (0.003)	1.11×10^{-7}	0.22	0.008 (0.008)	0.264	**8.15×10^{-8}**
4	KLHL8	rs442177	88,249,285	T	2.25	0.57	0.012 (0.003)	2.65×10^{-5}	0.57	-0.001 (0.006)	0.810	**5.48×10^{-5}**
3	MSL2L1	rs645040	137,409,312	T	2.22	0.79	0.007 (0.004)	0.0343	0.79	0.019 (0.008)	9.61×10^{-3}	**6.33×10^{-3}**
20	PLTP	rs4810479	43,978,455	C	3.32	0.22	0.009 (0.003)	0.0106	0.21	0.005 (0.008)	0.568	**6.47×10^{-3}**
2	COBLL1	rs10195252	165,221,337	T	2.01	0.56	0.007 (0.003)	0.0173	0.57	0.008 (0.006)	0.203	**6.81×10^{-3}**
16	CETP	rs7205804	55,562,390	G	2.88	0.57	0.006 (0.003)	0.0532	0.56	0.012 (0.006)	0.0462	0.0136
5	TIMD4	rs1553318	156,411,901	C	2.63	0.64	0.005 (0.003)	0.0739	0.67	0.017 (0.007)	0.0112	0.0144
11	APOA1–C3–A4–A5	rs964184	116,154,127	G	16.9	0.02	0.02 (0.01)	0.0364	0.02	0.008 (0.022)	0.721	0.0211
11	FADS1–2–3	rs174546	61,326,406	T	3.82	0.21	0.005 (0.004)	0.159	0.22	0.025 (0.008)	1.97×10^{-3}	0.0247
22	PLA2G6	rs5756931	36,875,979	T	1.54	0.68	0.006 (0.003)	0.0527	0.67	0.005 (0.007)	0.490	0.0248
2	IRS1	rs2943645	226,807,424	T	1.89	0.63	0.006 (0.003)	0.0332	0.63	-0.01 (0.006)	0.132	0.0428
8	PINX1	rs11776767	10,721,339	C	2.01	0.34	0.004 (0.003)	0.167	0.34	0.011 (0.007)	0.0903	0.0457
5	MAP3K1	rs9686661	55,897,543	T	2.57	0.12	0.007 (0.004)	0.126	0.12	0.003 (0.009)	0.740	0.0586
10	CYP26A1	rs2068888	94,829,632	G	2.28	0.51	0.005 (0.003)	0.0669	0.51	-0.009 (0.006)	0.170	0.0656
16	CTF1	rs11649653	30,825,988	C	2.13	0.62	0.003 (0.003)	0.331	0.61	0.013 (0.006)	0.0437	0.0763
6	HLA	rs2247056	31,373,469	C	2.99	0.61	0.004 (0.003)	0.234	0.61	0.006 (0.007)	0.362	0.0793
10	JMJD1C	rs10761731	64,697,616	A	2.38	0.57	0.004 (0.003)	0.182	0.55	0.001 (0.006)	0.899	0.0824
8	NAT2	rs1495743	18,317,580	G	2.97	0.24	0.005 (0.004)	0.191	0.25	0.001 (0.007)	0.871	0.0843
1	GALNT2	rs1321257	228,371,935	G	2.76	0.38	0.002 (0.004)	0.642	0.41	0.021 (0.006)	1.17×10^{-3}	0.102
19	CILP2	rs10401969	19,268,718	T	7.83	1	0.022 (0.023)	0.325	1	0.012 (0.052)	0.821	0.120
12	LRP1	rs11613352	56,078,847	C	2.7	1	-0.009 (0.021)	0.674	1	-0.059 (0.047)	0.206	0.158
12	ZNF664	rs12310367	123,052,631	A	2.42	0.76	0.002 (0.003)	0.526	0.76	0 (0.007)	0.984	0.164
15	FRMD5	rs2929282	42,033,223	T	5.13	0	-0.013 (0.035)	0.709	0	-0.051 (0.088)	0.560	0.177

* Effect sizes (beta) and standard errors (SE) in s.d. units.

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P value in bold indicates the significance at P<0.01 level.

Supplementary Table 4. The TC SNPs and their associations in the LifeLines and PREVEND cohorts.

TC SNPs						LifeLines			PREVEND			Meta
Chr	Near by Gene	SNP	Position	RA	Effect Size	RAF	beta (SE)*	P value	RAF	beta (SE)*	P value	P value#
19	APOE–C1–C2	rs4420638	50,114,786	G	0.176897	0.14	0.199 (0.018)	2.74×10^{-27}	0.14	0.135 (0.043)	1.59×10^{-3}	**6.71×10^{-29}**
19	LDLR	rs6511720	11,063,306	G	0.183631	0.92	0.178 (0.023)	8.25×10^{-15}	0.92	0.202 (0.056)	3.09×10^{-4}	**1.32×10^{-16}**
11	FADS1–2–3	rs174550	61,328,054	T	0.046102	0.67	0.103 (0.013)	1.52×10^{-15}	0.67	-0.022 (0.031)	0.483	**4.39×10^{-14}**
1	ANGPTL3	rs3850634	62,823,186	T	0.06734	0.65	0.084 (0.013)	3.58×10^{-11}	0.65	0.065 (0.031)	0.0334	**7.76×10^{-12}**
5	HMGCR	rs12916	74,692,295	C	0.073556	0.39	0.069 (0.012)	3.78×10^{-8}	0.41	0.077 (0.03)	0.0106	**4.79×10^{-8}**
2	GCKR	rs1260326	27,584,444	T	0.049469	0.35	0.06 (0.013)	1.82×10^{-6}	0.37	0.134 (0.03)	6.44×10^{-6}	**2.53×10^{-8}**
2	APOB	rs1367117	21,117,405	A	0.107744	0.32	0.068 (0.013)	1.53×10^{-7}	0.32	0.06 (0.031)	0.0524	**4.23×10^{-8}**
1	LDLRAP1	rs12027135	25,648,320	T	0.031598	0.56	0.067 (0.012)	3.17×10^{-8}	0.56	0.019 (0.029)	0.51	**4.24×10^{-8}**
1	SORT1	rs629301	109,619,829	T	0.140119	0.71	0.083 (0.017)	8.20×10^{-7}	0.72	0.113 (0.04)	4.25×10^{-3}	**7.78×10^{-8}**
8	TRIB1	rs2954022	126,551,803	C	0.05957	0.52	0.048 (0.012)	8.23×10^{-5}	0.53	0.037 (0.029)	0.198	**4.06×10^{-5}**
8	CYP7A1	rs1030431	59,474,251	A	0.032634	0.33	0.046 (0.013)	3.35×10^{-4}	0.35	0.04 (0.03)	0.184	**1.52×10^{-4}**
1	IRF2BP2	rs514230	232,925,220	T	0.035224	0.54	0.036 (0.012)	3.01×10^{-3}	0.53	0.088 (0.029)	2.21×10^{-3}	**3.55×10^{-4}**
20	TOP1	rs4297946	39,244,689	C	0.039368	0.42	0.04 (0.012)	1.29×10^{-3}	0.43	0.032 (0.03)	0.287	**6.79×10^{-4}**
1	PCSK9	rs2479409	55,277,238	G	0.050764	0.26	0.042 (0.014)	2.89×10^{-3}	0.25	0.052 (0.034)	0.13	**1.06×10^{-3}**
8	PLEC1	rs11136341	145,115,531	G	0.034706	0.34	0.043 (0.013)	6.95×10^{-4}	0.35	-0.018 (0.031)	0.559	**1.25×10^{-3}**
5	TIMD4	rs6882076	156,322,875	C	0.051282	0.65	0.034 (0.013)	8.38×10^{-3}	0.75	0.088 (0.034)	9.14×10^{-3}	**1.45×10^{-3}**
17	OSBPL7	rs7206971	42,780,114	A	0.026159	0.46	0.033 (0.012)	6.08×10^{-3}	0.46	0.036 (0.029)	0.215	**2.59×10^{-3}**
6	C6orf106	rs2814982	34,654,538	C	0.048174	0.93	0.076 (0.024)	1.71×10^{-3}	0.95	-0.042 (0.068)	0.534	**2.75×10^{-3}**
15	LIPC	rs1532085	56,470,658	A	0.039886	0.3	0.047 (0.015)	2.33×10^{-3}	0.31	-0.013 (0.037)	0.72	**3.02×10^{-3}**
1	MOSC1	rs2807834	219,037,216	G	0.035742	0.78	0.046 (0.017)	7.28×10^{-3}	0.75	-0.02 (0.041)	0.631	**8.41×10^{-3}**
10	GPAM	rs2255141	113,923,876	A	0.029526	0.27	0.031 (0.014)	0.025	0.28	0.046 (0.033)	0.162	**8.97×10^{-3}**
8	TRPS1	rs2737229	116,717,740	A	0.028749	0.65	0.031 (0.013)	0.0135	0.66	0.001 (0.031)	0.978	0.0107
6	LPA	rs1564348	160,498,850	C	0.056462	0.07	0.048 (0.024)	0.0464	0.07	0.112 (0.058)	0.0547	0.0123
2	ABCG5/8	rs4299376	43,926,080	G	0.077959	0.12	0.053 (0.02)	7.77×10^{-3}	0.13	-0.08 (0.046)	0.0826	0.0169
16	HPR	rs2000999	70,665,594	A	0.060606	0.41	0.026 (0.013)	0.0477	0.4	0.036 (0.031)	0.256	0.0186
7	DNAH11	rs2285942	21,549,442	T	0.04403	0.13	0.035 (0.018)	0.0512	0.12	0.032 (0.044)	0.459	0.0237
6	FRK	rs9488822	116,419,586	A	0.030562	0.67	0.026 (0.013)	0.0464	0.67	0.013 (0.031)	0.691	0.0254
11	UBASH3B	rs7941030	122,027,585	C	0.025123	0.37	0.027 (0.013)	0.0293	0.36	-0.029 (0.03)	0.333	0.0317
9	ABCA1	rs1883025	106,704,122	C	0.058016	0.75	0.027 (0.016)	0.0861	0.74	0.029 (0.037)	0.431	0.0363

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2	RAB3GAP1	rs6759321	136,039,146	T	0.030562	0.16	0.027 (0.017)	0.113	0.18	0.049 (0.038)	0.203	0.0378
12	BRAP	rs11065987	110,556,807	A	0.024864	0.57	0.023 (0.012)	0.0598	0.56	-0.005 (0.03)	0.871	0.0393
18	LIPG	rs7239867	45,418,715	G	0.050246	0.84	0.024 (0.016)	0.14	0.85	0.067 (0.04)	0.0964	0.0393
1	EVI5	rs7515577	92,782,026	A	0.030562	0.93	0.045 (0.025)	0.0655	0.95	0 (0.069)	0.996	0.0397
6	HLA	rs3177928	32,520,413	A	0.059829	0.18	0.019 (0.016)	0.232	0.18	0.104 (0.039)	7.48×10^{-3}	0.0435
20	ERGIC3	rs2277862	33,616,196	C	0.030821	0.86	0.029 (0.018)	0.0972	0.86	0.014 (0.042)	0.733	0.0476
7	NPC1L1	rs2072183	44,545,705	C	0.052059	0.19	0.024 (0.016)	0.115	0.19	0.016 (0.037)	0.668	0.0527
3	RAF1	rs2290159	12,603,920	G	0.036778	0.78	0.021 (0.015)	0.158	0.8	0.042 (0.037)	0.253	0.0531
6	HFE	rs1800562	26,201,120	G	0.055944	0.99	0.091 (0.067)	0.172	0.999	0.301 (0.506)	0.553	0.0686
8	NAT2	rs1961456	18,299,989	G	0.027713	0.3	0.02 (0.013)	0.134	0.31	-0.001 (0.031)	0.987	0.0687
16	CETP	rs3764261	55,550,825	A	0.043253	0.32	0.019 (0.013)	0.135	0.33	-0.001 (0.03)	0.964	0.0699
6	MYLIP	rs3757354	16,235,386	C	0.037814	0.78	0.021 (0.015)	0.162	0.78	0.004 (0.036)	0.916	0.0761
11	SPTY2D1	rs10832963	18,620,817	G	0.027454	0.74	0.021 (0.014)	0.124	0.72	-0.025 (0.032)	0.437	0.082
19	FLJ36070	rs492602	53,898,229	G	0.032893	0.52	-0.052 (0.044)	0.24	0.52	0.034 (0.111)	0.760	0.111
9	TTC39B	rs581080	15,295,378	C	0.040663	0.84	0.02 (0.016)	0.234	0.85	-0.019 (0.04)	0.643	0.113
12	HNF1A	rs1169288	119,901,033	C	0.037555	0.33	0.013 (0.014)	0.356	0.31	0.021 (0.034)	0.543	0.117
11	APOA1–C3–A4–A5	rs964184	116,154,127	G	0.121212	0.02	0.043 (0.042)	0.297	0.02	-0.07 (0.102)	0.491	0.137
11	ST3GAL4	rs11220463	125,753,421	T	0.052059	0.04	0.025 (0.031)	0.425	0.04	0.018 (0.071)	0.804	0.141
20	MAFB	rs2902940	38,524,901	A	0.035742	0.73	-0.01 (0.014)	0.467	0.73	-0.001 (0.034)	0.979	0.154
9	ABO	rs651007	135,143,696	T	0.05957	0.06	-0.016 (0.026)	0.546	0.06	-0.033 (0.066)	0.615	0.156
19	PPP1R3B	rs10401969	19,268,718	T	0.122766	0.999	0.002 (0.097)	0.984	0.999	-0.126 (0.246)	0.609	0.199
8	CILP2	rs2126259	9,222,556	C	0.081326	0.99	0.026 (0.068)	0.702	0.99	-0.562 (0.293)	0.055	0.199

* Effect sizes (beta) and standard errors (SE) in s.d. units.
# P value in bold indicates the significance at P<0.01 level

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Supplementary Table 5. Correlation between lipid risk scores and observed lipid levels in the Lifelines and PREVEND cohorts. The value of each cell presents the Spearman correlation coefficient (p value).

Lifelines				
	HDL weighted score	LDL weighted score	TG weighted score	TC weighted score
HDL cholesterol	0.236 (1.50×10^{-139})	-0.018 (0.057)	-0.097 (3.29×10^{-24})	0.027 (0.0051)
LDL cholesterol	-0.062 (8.36×10^{-11})	0.187 (1.97×10^{-87})	0.083 (3.50×10^{-18})	0.193 (2.04×10^{-92})
Triglycerides (TG)	-0.090 (4.74×10^{-21})	0.063 (5.34×10^{-11})	0.191 (4.19×10^{-91})	0.083 (3.54×10^{-18})
Total cholesterol (TC)	0.014 (0.14)	0.183 (4.82×10^{-83})	0.080 (4.35×10^{-17})	0.208 (1.97×10^{-107})
	HDL unweighted score	LDL unweighted score	TG unweighted score	TC unweighted score
HDL cholesterol	0.17 (3.2×10^{-70})	-0.005 (0.67)	-0.092 (2.9×10^{-22})	0.059 (4.5×10^{-10})
LDL cholesterol	-0.037 (0.00011)	0.151 (9.0×10^{-57})	0.072 (2.97×10^{-14})	0.154 (3.1×10^{-59})
Triglycerides (TG)	-0.085 (4.87×10^{-19})	0.059 (4.9×10^{-10})	0.156 (1.2×10^{-60})	0.075 (2.56×10^{-15})
Total cholesterol (TC)	0.011 (0.26)	0.154 (1.06×10^{-59})	0.065 (9.16×10^{-12})	0.181 (6.78×10^{-82})
PREVEND				
	HDL weighted score	LDL weighted score	TG weighted score	TC weighted score
HDL cholesterol	0.192 (3.3×10^{-21})	-0.032 (0.13)	-0.101 (7.1×10^{-7})	-0.007 (0.73)
LDL cholesterol	-0.058 (0.0046)	0.138 (1.15×10^{-11})	0.088 (1.64×10^{-5})	0.134 (4.68×10^{-11})
Triglycerides (TG)	-0.098 (1.42×10^{-6})	0.057 (0.0052)	0.209 (4.55×10^{-25})	0.06 (0.0033)
Total cholesterol (TC)	-0.004 (0.85)	0.14 (4.04×10^{-12})	0.08 (7.12x10-05)	0.144 (8.35×10^{-13})
	HDL unweighted score	LDL unweighted score	TG unweighted score	TC unweighted score
HDL cholesterol	0.142 (2.60×10^{-12})	-0.022 (0.29)	-0.08 (8.5×10^{-5})	0.024 (0.24)
LDL cholesterol	-0.043 (0.036)	0.111 (5.54×10^{-8})	0.095 (3.2×10^{-6})	0.091 (8.0×10^{-6})
Triglycerides (TG)	-0.097 (2.0×10^{-6})	0.05 (0.014)	0.166 (3.3×10^{-16})	0.034 (0.093)
Total cholesterol (TC)	-0.009 (0.67)	0.111 (3.8×10^{-8})	0.093 (4.8×10^{-6})	0.107 (1.3×10^{-7})

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Supplementary Table 6. The Spearman correlations between the weighted risk score and glucose-related traits adjusted for covariants.

LifeLines		
	FPG Level	**HbA1c Level**
HDL risk score	r = -0.002	r = 0.004
	P = 0.81	P = 0.66
LDL risk score	r = -0.012	r = -0.009
	P = 0.19	P = 0.33
TG risk score	r = -0.015	**r = -0.025**
	P = 0.13	**P = 0.01**
TC risk score	r = -0.007	r = -0.013
	P = 0.47	P = 0.16
PREVEND		
	FPG Level	**HOMA-IR**
HDL risk score	r = 0.024	r = 0.037
	P = 0.23	P = 0.069
LDL risk score	r = 0.046	r = 0.018
	P = 0.024	P = 0.39
TG risk score	r = -0.008	r = 0.035
	P = 0.71	P = 0.087
TC risk score	r = 0.034	r = 0.021
	P = 0.095	P = 0.29

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Supplementary Table 7. The pleiotropic association of 15 loci with glucose-related traits at single SNP level and their association with lipids.

Chr	NearbyGene	SNP	A1	A2	FPG	HbA1c	HOMA-IR	HDL	LDL	TG	TC
2	APOB	rs1042034	T	C	Z = -3.41	Z = -3.78	Z = -2.03	Z = -4.85	Z = 3.42	Z = 5.99	Z = 2.3
					P = 6.0×10^{-4}	P = 1.6×10^{-4}	P = 0.043	P = 1.5×10^{-6}	P = 5.8×10^{-4}	P = 3.2×10^{-9}	P = 0.014
2	GCKR	rs1260326	C	T	Z = 5.9	Z = 0.73	Z = 2.46	Z = 1.19	Z = -4.61	Z = -9.79	Z = -5.64
					P = 5.4×10^{-9}	P = 0.47	P = 0.014	P = 0.098	P = 4.9×10^{-6}	P = 3.2×10^{-22}	P = 2.5×10^{-8}
5	TIMD4	rs1553318	C	G	Z = -0.12	Z = 1.79	Z = -3.21	Z = -1.01	Z = 3.01	Z = 2.29	Z = 2.62
					P = 0.2	P = 0.073	P = 1.3×10^{-3}	p =0.12	P = 2.2×10^{-3}	P = 0.014	P = 6.4×10^{-3}
6	LPA	rs1564348	T	C	Z = 0.36	Z = 0.14	Z = -2.7	Z = 1.03	Z = -2.42	Z = -2.16	Z = -2.36
					P = 0.19	P = 0.89	P = 7.0×10^{-3}	P = 0.12	P = 0.011	P = 0.019	P = 0.012
6	HLA	rs2247056	C	T	Z = -0.47	Z = 0.03	Z = 2.64	Z = 1.11	Z = 1.89	Z = 1.36	Z = 2.09
					P = 0.18	P = 0.98	P = 8.2×10^{-3}	P = 0.11	P = 0.033	P = 0.079	P = 0.022
7	MLXIPL	rs17145738	C	T	Z = -2.8	Z = -2.76	Z = -2.61	Z = -1.55	Z = 0.79	Z = 6.36	Z = 0.98
					P = 3.9×10^{-3}	P = 5.7×10^{-3}	P = 9.0×10^{-3}	P = 0.06	P = 0.15	P = 3.3×10^{-10}	P = 0.12
7	NPC1L1	rs217386	A	G	Z = -0.26	Z = 0.42	Z = -2.71	Z = -0.7	Z = -0.36	Z = -0.56	Z = -0.65
					P = 0.19	P = 0.67	P = 6.6×10^{-3}	P = 0.16	P = 0.19	P = 0.17	P = 0.16
7	MLXIPL	rs7811265	A	G	Z = -2.96	Z = -2.89	Z = -2.72	Z = -1.55	Z = 0.61	Z = 6.32	Z = 0.92
					P = 2.5×10^{-3}	P = 3.8×10^{-3}	P = 6.5×10^{-3}	P = 0.06	P = 0.17	P = 4.3×10^{-10}	P = 0.13
8	CYP7A1	rs1030431	G	A	Z = 2.67	Z = 0.48	Z = 0.41	Z = -0.32	Z = -3.56	Z = -1.93	Z = -3.79
					P = 5.7×10^{-3}	P = 0.63	P = 0.68	P = 0.19	P = 3.6×10^{-4}	P = 0.031	P = 1.5×10^{-4}
11	FADS1-2-3	rs174550	C	T	Z = -2.52	Z = -2.55	Z = -0.09	Z = -4.57	Z = -7.22	Z = 2.8	Z = -7.63
					P = 8.4×10^{-3}	P = 0.011	P = 0.93	P = 5.9×10^{-6}	P = 9.8×10^{-13}	P = 4.0×10^{-3}	P = 4.4×10^{-14}
12	LRP1	rs3741414	C	T	Z = 1.54	Z = 2.64	Z = -1.4	Z = -2.34	Z = 0.59	Z = 0	Z = -0.01
					P = 0.061	P = 8.3×10^{-3}	P = 0.16	P = 0.013	P = 0.17	P = 0.2	P = 0.2
15	LACTB	rs2652834	G	A	Z = 0.09	Z = -0.7	Z = 3.12	Z = 0.08	Z = 0.19	Z = -0.36	Z = -0.01
					P = 0.2	P = 0.48	P = 1.8×10^{-3}	P = 0.2	P = 0.2	P = 0.19	P = 0.2
16	CETP	rs3764261	A	C	Z = 3.69	Z = 1.38	Z = 5.21	Z = 19.84	Z = -5.87	Z = -3.19	Z = 1.45
					P = 2.2×10^{-4}	P = 0.17	P = 1.8×10^{-7}	P = 6.10×10^{-87}	P = 6.7×10^{-9}	P = 1.2×10^{-3}	P = 0.07
16	CETP	rs7205804	A	G	Z = 3.28	Z = 2.6	Z = 4.16	Z = 17.76	Z = -4.7	Z= -2.32	Z= 1.76
					P = 9.2×10^{-4}	P = 9.2×10^{-3}	P = 3.2×10^{-5}	P = 6.2×10^{-70}	P = 3.1×10^{-6}	P = 0.014	P = 0.042
19	APOE-C1-C2	rs4420638	A	G	Z = 2.92	Z = 3.01	Z = 2.27	Z = 4.5	Z = -13.7	Z= -3.51	Z= -11.25
					P = 2.8×10^{-3}	P = 2.6×10^{-3}	P = 0.023	P = 8.00×10^{-6}	P = 3.60×10^{-42}	P = 4.2×10^{-4}	P = 6.7×10^{-29}

20	TOP1	rs4297946	G	C	Z = -2.57	Z = -0.51	Z = -1.65	Z = 0.17	Z = -2.99	Z = -1.55	Z = -3.37
					$P = 7.4 \times 10^{-3}$	P = 0.61	P = 0.098	P = 0.2	$P = 2.3 \times 10^{-3}$	P = 0.06	$P = 6.8 \times 10^{-4}$
20	PLTP	rs4810479	C	T	Z = -2.95	Z = -3.91	Z = -0.12	Z = -4.44	Z = 1.59	Z = 2.62	Z = 0.35
					$P = 2.5 \times 10^{-3}$	$P = 9.2 \times 10^{-5}$	P = 0.9	$P = 1.1 \times 10^{-5}$	P = 0.057	$P = 6.5 \times 10^{-3}$	P = 0.19
20	PLTP	rs6065906	C	T	Z = -2.03	Z = -2.94	Z = 0.42	Z = -4.9	Z = 1.47	Z = 3.21	Z = 0.26
					P = 0.026	$P = 3.3 \times 10^{-3}$	P = 0.67	$P = 1.20 \times 10^{-6}$	P = 0.068	$P = 1.2 \times 10^{-3}$	P = 0.19

* positive Z value, A1 allele is associated with higher level.

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Supplementary Table 8. Comparison of the association before and after adjusting for lipids.

			After adjusting lipids		Before adjusting lipids	
SNP	A1	A2	Z score	P value	Z score	P value
FPG						
rs1260326	C	T	5.9	5.4×10^{-9}	4.05	5.40×10^{-5}
rs3764261	A	C	3.69	2.2×10^{-4}	1.2	0.097
rs1042034	T	C	-3.41	6.0×10^{-4}	-1.87	0.034
rs7205804	A	G	3.28	9.2×10^{-4}	1.17	0.10
rs7811265	A	G	-2.96	2.5×10^{-3}	-1.81	0.039
rs4810479	C	T	-2.95	2.5×10^{-3}	-2.08	0.023
rs4420638	A	G	2.92	2.8×10^{-3}	1.53	0.062
rs17145738	C	T	-2.8	3.9×10^{-3}	-1.65	0.051
rs1030431	G	A	2.67	5.7×10^{-3}	2.21	0.017
rs4297946	G	C	-2.57	7.4×10^{-3}	-2.81	3.8×10^{-3}
rs174550	C	T	-2.52	8.4×10^{-3}	-1.88	0.034
HbA1c						
rs1042034	T	C	-3.78	1.62×10^{-4}	-2.98	2.9×10^{-3}
rs17145738	C	T	-2.76	5.72×10^{-3}	-2.39	0.017
rs3741414	C	T	2.64	8.3×10^{-3}	2.75	5.9×10^{-3}
rs4420638	A	G	3.01	2.6×10^{-3}	1.25	0.21
rs4810479	C	T	-3.91	9.2×10^{-5}	-3.41	6.6×10^{-4}
rs6065906	C	T	-2.94	3.3×10^{-3}	-2.42	0.016
rs7205804	A	G	2.6	9.2×10^{-3}	1.12	0.26
rs7811265	A	G	-2.89	3.8×10^{-3}	-2.52	0.012
HOMA-IR						
rs1553318	C	G	-3.21	1.3×10^{-3}	-2.1	0.036
rs1564348	T	C	-2.7	7.0×10^{-3}	-3.05	2.3×10^{-3}
rs17145738	C	T	-2.61	9.0×10^{-3}	-1.07	0.28
rs217386	A	G	-2.71	6.6×10^{-3}	-3.03	2.4×10^{-3}
rs2247056	C	T	2.64	8.2×10^{-3}	2.5	0.012
rs2652834	G	A	3.12	1.8×10^{-3}	1.92	0.054
rs3764261	A	C	5.21	1.8×10^{-7}	3.13	1.8×10^{-3}
rs7205804	A	G	4.16	3.2×10^{-5}	1.96	0.05
rs7811265	A	G	-2.72	6.5×10^{-3}	-1.2	0.23