Online Appendix A

This Appendix is included to provide additional information on the availability of data and materials and descriptive statistics of the data used.

Availability of data and materials.

Lifelines data are not publicly available. Researchers can apply to use the Lifelines data used in this study. The specific dataset and code of this study are preserved at Lifelines Biobank server, section (OV19_0549). More information about how to request Lifelines data and the conditions of use can be found on their website (https://www.lifelines-biobank.com/researchers/working-with-us).

Extra Results and Descriptive Statistics of the Data

In Figure 5, the representation association plots based on the results with Logistic Regression are shown. Due to similarity with the plots concerning Extreme Gradient Boosting (Figure 3 in the main paper), except for a slightly less smooth curves for CVD and Age, the curves do not provide additional insight for the empirical demonstration of the visual approach.

Variable names in Table 2 to 6 are kept as they appear in the database, the exact definition of each can be looked up online through the Lifelines catalogue (https://data-catalogue.lifelines.nl/).

Table 1: Base rates of developing CVD and T2D in Lifelines data

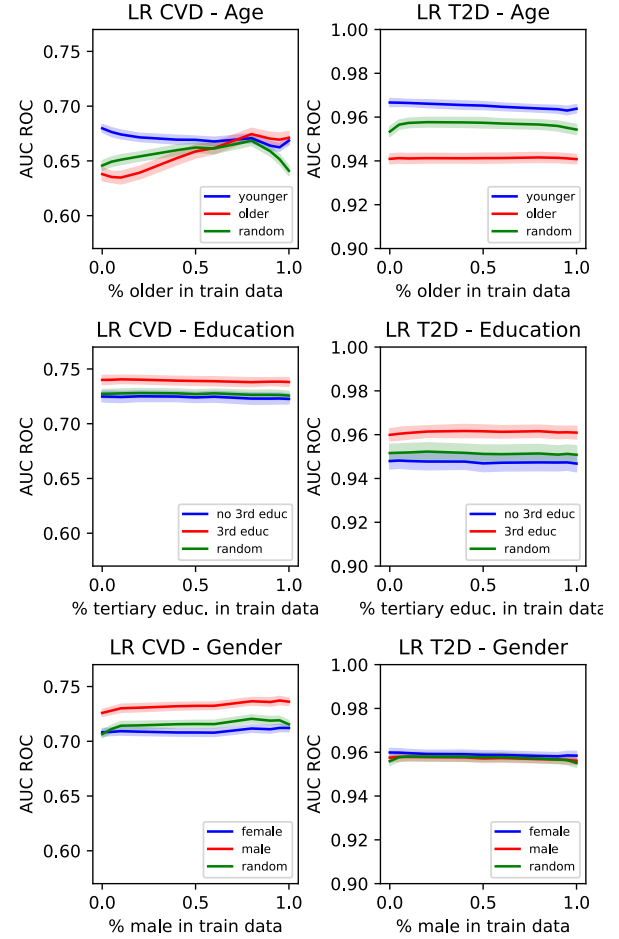| Subgroup	CVD (%)	T2D (%)
Younger (below 50)	1.41	0.68
Older (above 50)	4.58	1.81
Female	1.82	0.81
Male	3.17	1.30
No tertiary education	2.57	1.21
With tertiary education	1.91	0.59
Total	2.43	1.03

Figure 5: Representation association plots for Logistic Regression showing AUC-ROC performance for CVD (left) and T2D (right).

Table 2: Description of Numerical Variables

Name	Type 2 Diabetes				Cardio Vascular Diseases			
	Missing (%)	Min	Mean	Max	Missing (%)	Min	Mean	Max
age	0.0	18.0	45.3	90.0	0.8	18.0	45.3	90.0
squashsum_minperweek_adu_c2_	8.2	0.0	408.1	6720.0	10.1	0.0	408.1	6720.0
squashsum_minperweek_adu_c_2_c	8.2	0.0	89.9	3540.0	10.1	0.0	89.9	3540.0
squashsum_mvpaduration_adu_c_1	8.2	0.0	498.0	6720.0	10.1	0.0	498.0	6720.0
relationship_duration_adu_q_1	12.6	0.0	21	89.0	13.6	0.0	21.0	89.0
consumption_coffee_adu_c_038	20.2	0.0	430.3	1393.5	22.0	0.0	430.3	1393.5
circumference_hip_all_m_1	0.0	60.0	99.3	185.0	0.8	60.0	99.3	185.0
circumference_waist_all_m_1	0.0	54.0	89.7	168.0	0.8	54.0	89.7	168.0
bpavg_arterial_all_m_1	0.1	0.0	93.2	172.0	0.9	0.0	93.2	172.0
bpavg_diastolic_all_m_1	0.1	35.0	73.8	143.0	0.8	35.0	73.8	143.0
bpavg_systolic_all_m_1	0.1	72.0	125.4	225.0	0.8	72.0	125.4	225.0
basoperc_result_all_m_1	2.3	0.0	0.5	5.0	3.3	0.0	0.5	5.0
eosinoconc_result_all_m_1	2.3	0.0	0.2	3.8	3.3	0.0	0.2	3.8
eosinoperc_result_all_m_1	2.3	0.0	3.1	41.9	3.3	0.0	3.1	41.9
erythrocyte_result_all_m_1	0.9	2.7	4.7	8.5	1.7	2.7	4.7	8.5
hba1pcperc_result_all_m_1	1.2	2.5	5.5	12.4	2.1	2.5	5.5	12.4
hemoglobin_result_all_m_1	0.8	3.3	8.8	13.1	1.7	3.3	8.8	13.1
leukocyte_result_all_m_1	0.8	1.2	6	59.5	1.7	1.2	6.0	59.5
lymphoconc_result_all_m_1	2.3	0.3	2	10.5	3.3	0.3	2.0	10.5
lymphoperc_result_all_m_1	2.3	3.7	34.2	69.4	3.3	3.7	34.2	69.4
monoconc_result_all_m_1	2.3	0.0	0.5	1.6	3.3	0.0	0.5	1.6
monoperc_result_all_m_1	2.3	0.0	8.2	29.9	3.3	0.0	8.2	29.9
neutroconc_result_all_m_1	2.3	0.5	3.3	18.8	3.3	0.5	3.3	18.8
neutroperc_result_all_m_1	2.3	15.0	54	91.6	3.3	15.0	54.0	91.6
thrombocyte_result_all_m_1	0.9	8.0	249.1	1978.0	1.8	8.0	249.1	1978.0
hba1c_baseline	18.7	4.0	36.8	110.0	18.8	4.0	36.8	110.0
cholesterol_result_all_m_1	0.7	1.8	5.1	15.6	1.6	1.8	5.1	15.6
creatinine_result_all_m_1	0.7	16.0	73.7	581.0	1.6	16.0	73.7	581.0
glucose_baseline	1.0	1.9	4.9	22.1	2.0	1.9	4.9	22.1
hdichol_result_all_m_1	0.7	0.1	1.5	4.1	1.6	0.1	1.5	4.1
ldichol_result_all_m_1	0.7	0.1	3.3	13.2	1.6	0.1	3.3	13.2
potassium_result_all_m_1	0.7	1.9	3.9	24.3	1.6	1.9	3.9	24.3
triglyceride_result_all_m_1	0.7	0.0	1.2	37.3	1.6	0.0	1.2	37.3
alat_result_all_m_1	57.7	0.0	23	815.0	58.6	0.0	23.0	815.0
albumin_result_all_m_1	57.7	30.0	45.1	55.0	58.6	30.0	45.1	55.0
alkphos_result_all_m_1	57.7	1.0	61.5	627.0	58.6	1.0	61.5	627.0
asat_result_all_m_1	57.7	4.0	24.2	578.0	58.6	4.0	24.2	578.0
calcium_result_all_m_1	57.7	0.0	2.3	3.0	58.6	0.0	2.3	3.0
gammagt_result_all_m_1	57.7	1.0	25.7	1287.0	58.6	1.0	25.7	1287.0
phosphate_result_all_m_1	57.7	0.3	0.9	1.8	58.6	0.3	0.9	1.8
urea_result_all_m_1	57.7	1.4	5.2	21.3	58.6	1.4	5.2	21.3
hscrp_result_all_m_2	65.2	0.2	2.5	247.0	65.7	0.2	2.5	247.0
apolipoa1_result_all_m_2	74.8	0.1	1.5	3.2	75.4	0.1	1.5	3.2
apolipob100_result_all_m_2	74.8	0.0	0.9	2.5	75.4	0.0	0.9	2.5
t3free_result_all_m_1	71.2	1.1	5.2	46.8	71.4	1.1	5.2	46.8
t4free_result_all_m_1	71.2	0.3	15.8	86.8	71.4	0.3	15.8	86.8
tsh_result_all_m_1	71.3	0.0	2.6	535.0	71.5	0.0	2.6	535.0
apolipoa1_result_all_m_1	94.0	0.9	1.6	2.9	94.3	0.9	1.6	2.9
apolipob100_result_all_m_1	94.0	0.2	0.9	2.2	94.3	0.2	0.9	2.2
hscrp_result_all_m_1	94.2	0.1	2.5	116.0	94.5	0.1	2.5	116.0
anticcp_result_all_m_1	73.6	0.0	2.2	340.0	74.0	0.0	2.2	340.0
ctdscreen_result_all_m_1	73.6	0.0	0.3	999.0	74.0	0.0	0.3	999.0
BMI	0.0	13.9	25.9	73.6	1.1	13.9	25.9	73.6

Table 3: Description of Categorical Variables

Variable	Variable Category	Developed T2D?		Developed CVD?	
		No	Yes	No	Yes
gender	FEMALE	54944	447	54804	1004
	MALE	38633	510	37811	1237
	Unanswered	0	6	711	22
degree_highest_adu_q_1	no	64601	791	64259	1695
	yes	28976	172	29067	568
	Unanswered	237	16	921	33
divorce_presence_adu_q_1	Unanswered	600	40	2643	166
	no	81328	785	79354	1747
	yes, once	10770	129	10467	311
	yes, several times	879	9	862	39
maritalstatus_current_adu_q_1	Unanswered	31413	256	31291	713
	divorced	1978	25	1993	74
	living together	9447	62	9387	130
	married/registered partnership	41716	520	41420	1185
	other	559	4	547	8
	single	5211	47	5352	70
	stable partner, not living together	2300	18	2330	32
	widow(er)	953	31	1006	51
partner_presence_adu_q_1	Unanswered	62205	713	62783	1572
	no, I am single/ I have no partner	3889	32	3798	88
	other	366	3	350	16
	yes, I am in a relationship but living apart	2132	10	2117	31
	yes, I am married	19464	178	18776	482
	yes, I have a live-in partner/reg. partnership	5521	27	5502	74
ethnicity_category_adu_q_1	Unanswered	7989	117	9589	340
	asian	346	10	370	11
	black/negroid	121	3	113	1
	other	755	10	708	16
	white/eastern and western european	84121	818	82316	1892
	white/mediterranean or arabic	245	5	230	3
smoking_question_adu_q_1	Unanswered	1746	45	3794	196
	no	74468	729	72595	1663
	yes	17363	189	16937	404

Table 4: Descriptives of CVD-specific survey questions

Variable	Category	0	1
cvd_father_fam_q_1_a	Unanswered	84802	1996
	no	3669	75
	yes	4855	192
cvd_father_fam_q_1_b	Unanswered	74030	1737
	no	3074	61
	yes	16222	465
cvd_father_fam_q_1_c	Unanswered	88776	2164
	no	3890	84
	yes	660	15
cvd_father_fam_q_1_d	Unanswered	83642	2006
	no	3605	75
	yes	6079	182
cvd_father_fam_q_1_e	Unanswered	83318	1964
	no	3381	72
	yes	6627	227
cvd_father_fam_q_1_f	Unanswered	84457	2015
	no	3469	73
	yes	5400	175
cvd_mother_fam_q_1_a	Unanswered	88217	2129
	no	3912	82
	yes	1197	52
cvd_mother_fam_q_1_b	Unanswered	83435	1944
	no	3651	76
	yes	6240	243
cvd_mother_fam_q_1_c	Unanswered	88812	2163
	no	3943	85
	yes	571	15
cvd_mother_fam_q_1_d	Unanswered	84537	1990
	no	3721	74
	yes	5068	199
cvd_mother_fam_q_1_e	Unanswered	84966	1992
	no	3629	73
	yes	4731	198
cvd_mother_fam_q_1_f	Unanswered	86731	2085
	no	3695	79
	yes	2900	99

Table 5: Descriptives of CVD-specific survey questions

Variable	Category	0	1
cvd_siblings_fam_q_1_a	0	3354	73
	1	1758	106
	2	176	18
	>2	157	8
	Unanswered	87881	2058
cvd_siblings_fam_q_1_b	0	3286	66
	1	2386	151
	2	436	44
	>2	309	30
	Unanswered	86909	1972
cvd_siblings_fam_q_1_c	0	3423	79
	1	639	19
	2	20	1
	>2	36	3
	Unanswered	89208	2161
cvd_siblings_fam_q_1_d	0	3429	83
	1	969	41
	2	77	6
	>2	62	8
	Unanswered	88789	2125
cvd_siblings_fam_q_1_e	0	3308	78
	1	1612	80
	2	205	23
	>2	171	25
	Unanswered	88030	2057
cvd_siblings_fam_q_1_f	0	3346	77
	1	1048	69
	2	129	9
	>2	108	9
	Unanswered	88695	2099

Table 6: Descriptives of T2D-specific survey questions

Name	Category	0	1
diabetes_father_fam_q_1_a	Unanswered	89352	929
	no	4027	32
	yes	198	2
diabetes_father_fam_q_1_b	Unanswered	81280	789
	no	3572	27
	yes	8725	147
diabetes_mother_fam_q_1_a	Unanswered	89290	924
	no	4060	32
	yes	227	7
diabetes_mother_fam_q_1_b	Unanswered	79485	690
	no	3550	22
	yes	10542	251
diabetes_siblings_fam_q_1_a	0	3502	28
	1	351	8
	2	26	1
	>2	41	0
	Unanswered	89657	926
diabetes_siblings_fam_q_1_b	0	3297	24
	1	3202	76
	2	493	29
	>2	411	31
	Unanswered	86174	803