Supplementary Methods, Tables & Figures

Diabetes Type 2 in the Berlin Aging Study II: Cross-sectional and Longitudinal Data on Prevalence, Incidence and Severity Over on Average Seven Years of Follow-up

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Supplementary Methods

Selectivity Analysis

We performed a number of selectivity analysis to examine how participants who remained in the study, differed from those who didn't (for further details see (Lindenberger et al., 2002)). To begin with, we estimated mortality-related selectivity. In total 126 participants died between the first and the second measurement point. At baseline, individuals still alive at follow-up were 0.71 standard deviations younger than those participants who deceased between baseline and follow-up. In addition, those participants who deceased between the two time points where more likely to be male (-0.24), reported 0.28 standard deviations lower educational level and 0.23 standard deviations higher in morbidity.

A total of 462 participants dropped out of the study due to other reasons, which are not documented in detail. Those participants dropped out where slightly older (0.19), less educated (-0.24) but did not differ in their gender (0.06) and morbidity (0.02).

Diabetes Complications Severity Index (DCSI)

The index scale for each category ranges from 0-2 (0=no complication; 1=some complication; 2=severe complication), except for neuropathy, which is scored with 0-1, resulting in a maximum value of 13. Information on acute metabolic complications were not considered in our questionnaires and therefore this information is not available; thus, a maximum score value of 11 was achievable in our cohort. We computed the DCSI based on the data available in the BASE-II baseline and GendAge follow-up datasets and representing the DCSI categories as accurate as possible.

Supplementary Tables

Supplementary Table 1: Characteristics of baseline participants lost to follow-up compared to participants with baseline and follow-up data available

Variables	Only baseline data available Deceased (N=126)		Only baseline data available Drop-out for other reasons (N=462)		Baseline and follow-up data available (N=1.083)	
	Mean ±SD, %, or IQR	Number of observations	Mean ±SD, %, or IQR	Number of observations	Mean ±SD or %	Number of observations
Females	30.2	38	54.1	250	51.99	563
Age at baseline (years)	71.0 ±4.7	126	69.3 ±3.59	462	68.3 ±3.5	1083
Education (years)	13.9 IQR 6.5	116	14.0 IQR 6.5	392	14.5 IQR 6.0	994
Morbidity index[a]	1.6 ±1.5	126	1.2 ±1.3	462	1.0 ±1.2	986

IQR=Interquartile range; [a]modified version of the morbidity index originally described by (Charlson et al., 1987), for details see (A. Meyer et al., 2016).

Supplementary Table 2: DCSI variables applied to Berlin Aging Study II

	Variables DCSI	Anamnestic information and laboratory data in Berlin Aging Study - II
Retinopathy	Diabetic ophthalmologic disease	Retinopathy
	Background retinopathy	Retinopathy
	Other retinopathy	Retinopathy
	Retinal edema	Not applied
	Csme (cystoid macular edema/degeneratio	Not applied
	Other retinal disorders	Not applied
	Proliferative retinopathy	Retinopathy (1 point)
	Retinal detachment	Retinal detachment
	Blindness	Not applied
	Vitreous hemorrhage	Not applied
Nephropathy	Diabetic nephropathy	T2D diagnosis + microalbuminuria (albumin:creatinine ratio > 30 mg/g)
	Acute glomerulonephritis	Glomerulonephritis
	Nephrotic syndrome	peripheral edema + albumin:creatinine ratio > 2,2 g/g
	Hypertension, nephrosis	Hypertension + albumin:creatinine ratio > 2,2 g/g
	Chronic glomerulonephritis	Glomerulonephritis
	Nephritis / nephropathy	Glomerulonephritis / interstitial nephritis
	Chronic renal failure	Chronic renal failure
	Renal failure Not Otherwise Specified	Not applied
	Renal insufficiency	Renal insufficiency
	Urine protein >=30 mg/g of creatinine, or (+) dipstick protein or serum creatinine >1,5 mg/dL	Albumin creatinine ratio ≥ 19mg/g or serum creatinine > 1,5 mg/dL
	Serum creatinine >2.0 mg/dL	Serum creatinine > 2.0 mg/dL
Neuropathy	Diabetic neuropathy	Not applied
	Amyotrophy	Not applied
	Cranial nerve palsy	Cranial nerve palsy except for facial or trigeminal nerve
	Mononeuropathy	Not applied
	Charcot's arthropathy	Not applied
	Polyneuropathy	Polyneuropathy + T2D diagnosis
	Neurogenic bladder	Not applied
	Autonomic neuropathy	Autonomic neuropathy
	Gastroparesis/diarrhea	Not applied
	Orthostatic hyoptension	Not applied
Cerebrovascular	TIA	Cerebral circulatory disorder
	Stroke	Stroke
Cardiovascular	Atherosclerosis	Coronary artery disease, peripheral artery disease, disease of cerebral arteries
	Other IHD (ischemic heart disease)	Not applied
	Angina pectoris	Angina pectoris
	Other chronic IHD	Not applied
	Myocardial infarction	Myocardial infarction
	Ventricular fibrillation, arrest	Cardiac arrhythmias
	Atrial fibrillation, arrest	Cardiac arrhythmias
	Other ASCVD	Not applied
	Old myocardial infarction	Old myocardial infarction
	Heart failure	Heart failure
	Atherosclerosis, severe	Not applied
	Aortic aneurysm / dissection	Not applied
Peripheral vascular disease	Diabetic PVD	T2D diagnosis + peripheral arterial disease
	Other aneurysm, LE	Not applied
	PVD (periphal vascular disease)	Peripheral arterial disease
	Foot wound + complication	Foot wound (≥3°, except toe(s) alone)
	Claudication, intermittent	Claudication, intermittent
	Embolism / thrombosis (LE)	Embolism / thrombosis (LE)
	Gangrene	Gangrene
	Gas gangrene	Not applied
	Ulcer of lower limbs	Varicose ulcer
Metabolic	Ketoacidosis	Not applied
	Hyperosmolar	Not applied
	Other coma	Not applied

Supplementary Table 3. Logistic Regression analyses of incident diabetes on fasting glucose, 2h-glucose (OGTT) respectively HbA1c.

N=860				
Model	Estimate	SE	OR	p-value
Fasting Glucose	0.120	0.015	1.127	< 0.001
2h-glucose (OGTT)	0.026	0.004	1.027	< 0.001
HbA1c	3.604	0.482	36.735	< 0.001

SE = standard error; OR = odds ratio.

Supplementary Table 4. Sex-stratified logistic regression analyses of incident diabetes on fasting glucose, 2h-glucose (OGTT) and HbA1c.

Male N=417				
Model	Estimate	SE	OR	p-value
Fasting Glucose	0.130	0.021	1.139	< 0.001
2h-glucose (OGTT)	0.020	0.006	1.020	< 0.001
HbA1c	4.204	0.705	66.955	< 0.001
Female N=443				
Model	Estimate	SE	OR	p-value
Fasting Glucose	0.113	0.021	1.119	< 0.001
2h-glucose (OGTT)	0.037	0.007	1.038	< 0.001
HbA1c	2.979	0.671	19.666	< 0.001

SE = standard error; OR = odds ratio.

Supplementary Table 5. Characteristics of BASE-II participants diagnosed with diabetes mellitus type 2 at baseline (N=209 of 1,671) and follow-up (N=185 of 1,083).

Variables	BASE-II baseline		BASE-II follow-up	
	Mean ±SD or %	Number of observations	Mean ±SD or %	Number of observations
Females	37.3	78	41.1	76
Age (years)	68.7 ±3.7	209	75.6 ±4.2	185
T2D new diagnosis (unaware of disease)	24.9	52	22.2	41
Fasting glucose (mg/dl)	129.0 ±36.1	202	135.3 ±33.0	185
2h-OGTT (mg/dl)	213.3 ±60.4	48	209.1 ±36.0	39
HbA1c (mmol/mol) [%]	48 ±9 [6.6 ±0.8]	197	48 ±9 [6.5 ±0.8]	184
Anamnestic history of T2D (self-report)	72.8	150	70.8	131
Antidiabetic medication	53.4	111	54.1	100
Smoking (packyears)	14.5 ±19.4	198	13.7 ±21.6	169
Alcohol (4 times a week or more)	29.0	60	24.3	45
RAPA score	4.8 ±1.6	200	4.6 ±1.2	185
BMI	29.6 ±4.7	205	29.1 ±4.2	184
Morbidity index*	1.2 ±1.3	191	1.7 ±1.6	148

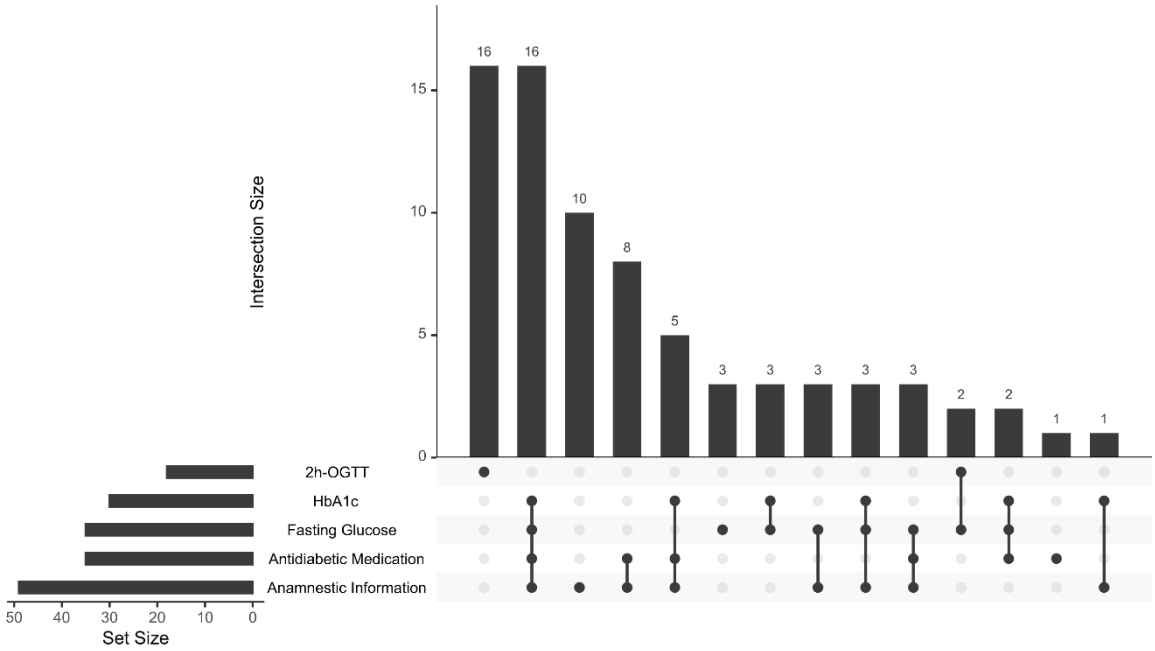
T2D = diabetes mellitus type 2; 2h-OGTT = oral glucose tolerance test (OGTT was only performed when T2D was not known); RAPA = rapid assessment of physical activity; BMI = body mass index; *modified version of the morbidity index originally described by (Charlson et al., 1987), for details see (Antje Meyer et al., 2016).

Supplementary Table 6: Impact (in percent) and absolute score values of each DCSI category in BASE-II at baseline and follow-up (N=111).

DCSI category	Baseline % (absolute score value)	Follow-up % (absolute score value)
Retinopathy	6.3 (7)	9.0 (10)
Nephropathy	21.6 (24)	61.3 (68)
Neuropathy	8.1 (9)	26.1 (29)
Cerebrovascular	1.8 (2)	7.2 (8)
Cardiovascular	43.2 (48)	67.6 (75)
Peripheral vascular disease	27.9 (31)	28.8 (32)

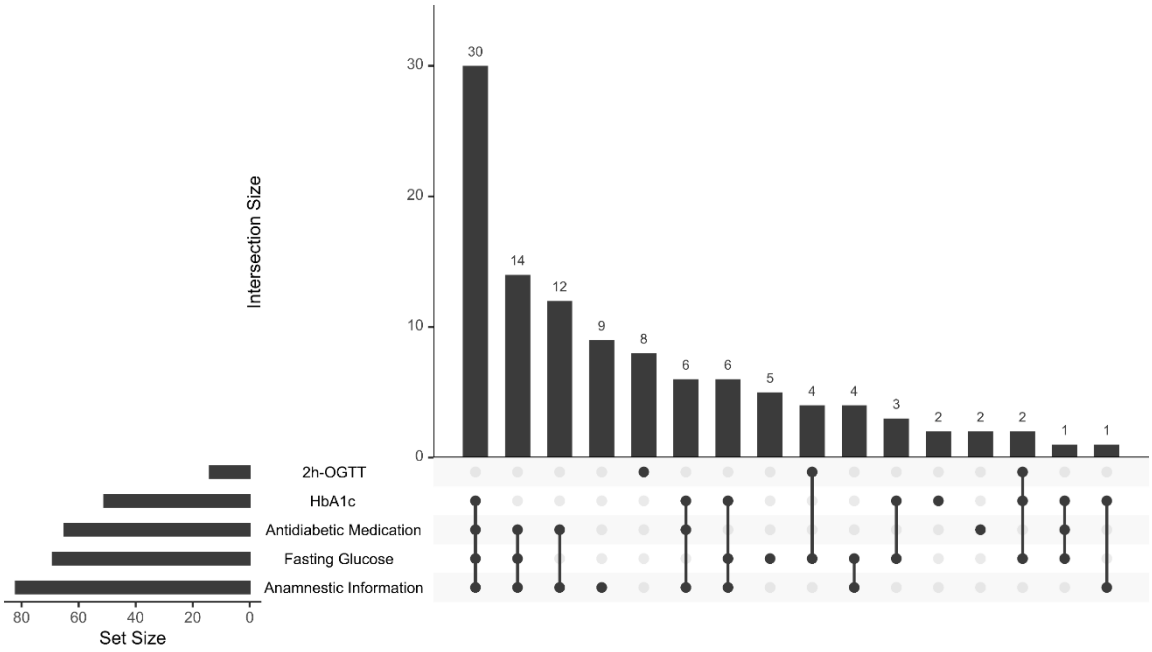
Supplementary Figures

Supplementary Figure 1: Type 2 Diabetes diagnosis in women at follow-up (N=76).



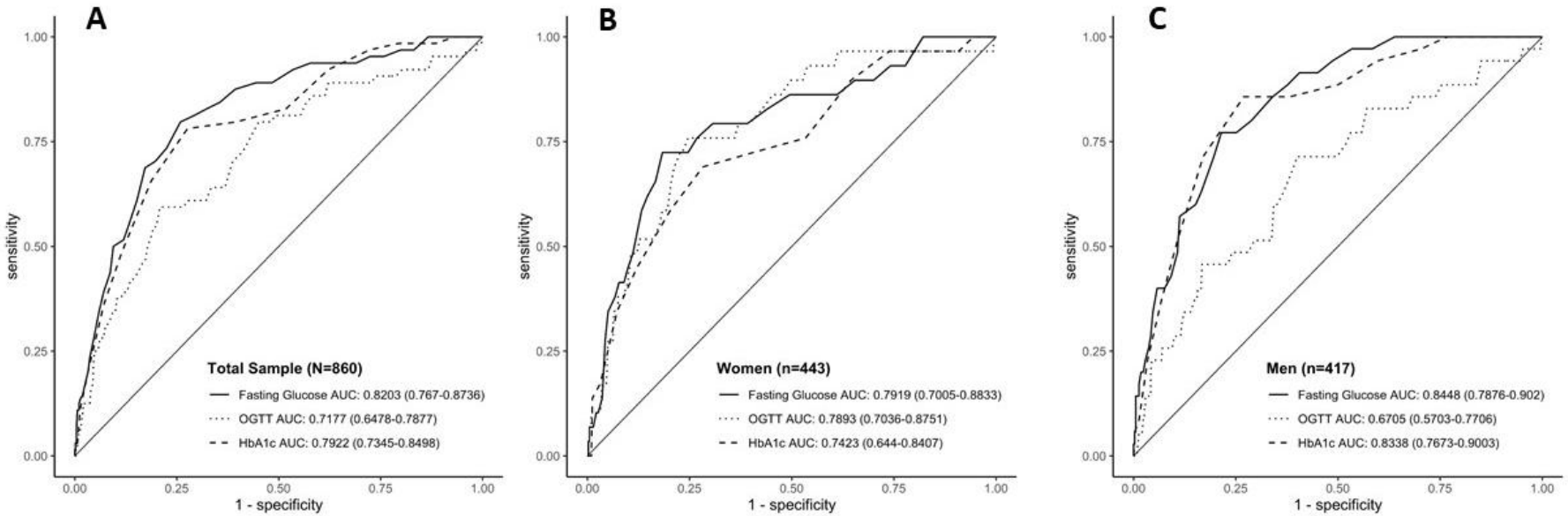
Diabetes diagnosis criteria at follow-up and their combinations (OGTT was only performed when T2D was not known): Anamnestic information, fasting glucose, antidiabetic medication, HbA1c and 2h-OGTT. OGTT= oral glucose tolerance test.

Supplementary Figure 2: Type 2 Diabetes diagnosis in men at follow-up (N=109).



Diabetes diagnosis criteria at follow-up and their combinations (OGTT was only performed when T2D was not known): Anamnestic information, fasting glucose, antidiabetic medication, HbA1c and 2h-OGTT. OGTT= oral glucose tolerance test.

Supplementary Figure 3



Supplementary Figure 3: Capacity of glucose status laboratory parameters to predict incident diabetes.
ROC curves showing the capacity to predict incident diabetes of fasting glucose, HbA1c and 2h-glucose (OGTT) in N=860 women and men (A) and separate for for N=443 women (B) and N=417 men (C) with data on all three tested parameters available. Data on a total of 64 incident diabetes cases of which 29 were women and 35 were men were available for this analyses.

References

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