

## Supplementary Material

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## **Appendix S1. Detailed description of registers used in this study**

The Danish National Health Service provides universal tax-supported healthcare, guaranteeing unfettered access to general practitioners and hospitals, and partial reimbursement for prescribed drug treatment. Since the 1960s, when the population registration systems started, all live births and new residents in Denmark have been assigned a unique individual personal identification number (Central Personal Register number, CPR). The CPR is encrypted by a unique code, which can be used for linkage between different national registers and ensures that national data protection, privacy, and confidentiality requirements are fulfilled.

### The Danish Civil Registration System (CRS)

The Danish Civil Registration System (CRS)<sup>1</sup> was established on April 2, 1968, and registers all people living in Denmark. The CRS includes the unique individual personal identification number, sex, date and place of birth, current address, marital status, spouse, parents, children, and vital statistics.

### The Danish Medical Birth Registry (MBR)

The Danish Medical Birth Registry (MBR)<sup>2</sup> was established in 1968, and has been computerized since 1973. The MBR includes birth characteristics, such as gestational age, birth weight, Apgar score at 5 minutes, parity, date of birth, sex, singleton or not, and maternal smoking during pregnancy.

### The Danish National Patient Register (DNPR)

The Danish National Patient Register (DNPR)<sup>3</sup> was established in 1977. The DNPR contains hospital discharge diagnoses from 1977, and outpatient and emergency diagnoses are included from 1995 and onwards. We used the Danish National Patient Registry covering all Danish hospitals to identify the study population, comorbidities within the study population, and non-fatal endpoints. Each hospital discharge or outpatient visit is recorded in the registry with one primary diagnosis and potentially several secondary

diagnoses, each classified according to the ICD-8 codes (*International Classification of Disease* codes, 8th revision) and ICD-10 codes when implemented.

#### The Danish Register of Causes of Death

The Danish Register of Causes of Death<sup>4</sup> has been computerized since 1970. Danish law mandates registration of the date and cause of death for all Danish citizens who die in Denmark. The ICD-8 was used to classify the causes of death during 1970-1993 and the ICD-10 was used from 1994 onward.

#### The Danish National Prescription Registry

The Danish National Prescription Registry<sup>5</sup> contains information on all prescriptions dispensed at community pharmacies in Denmark since 1995, including date of dispensing and drug class according to the Anatomical Therapeutic Chemical [ATC] classification system.

#### The Danish National Diabetes Register

The Danish National Diabetes Register<sup>6,7</sup> was established based on data from existing Danish health registers, including from the Danish National Registry of Patients<sup>3</sup>, the National Health Insurance Service Register<sup>8</sup>, the Danish National Prescription Registry<sup>5</sup>, and the Civil Registration System<sup>1</sup>. The Danish National Diabetes Register contains information on individuals diagnosed with diabetes by general and specialist practitioners in Denmark. Individuals are classified as having diabetes if they are registered with at least one of the following criteria: (1) a diagnosis of diabetes (ICD-8 codes: 249, 250; ICD-10 codes: E10-E11, H36.0, O24 excluding O24.4 and O24.9); (2) receipt of chiropody for diabetic patients; (3) two redeemed prescriptions for insulin (ATC code: A10A); (4) two redeemed prescriptions for oral antidiabetics (ATC code: A10B); or (5) two blood glucose measurements per year in five consecutive years.

#### The Danish Integrated Database for Longitudinal Labour Market Research

The Danish Integrated Database for Longitudinal Labour Market Research<sup>9</sup> was established in 1981, and contains information on personal labour market affiliation and education.

## **Appendix S2. Detailed description of methods used to identify diabetes**

Information on diabetes diagnoses was retrieved from the Danish National Diabetes Register (1995-2016),<sup>7</sup> the Danish National Patient Registry (1977-2016),<sup>10</sup> and the Danish National Prescription Registry (1994-2016)<sup>5</sup> using *International Classification of Disease* codes (ICD-8 codes during 1970-1993 and ICD-10 codes since 1994) and *Anatomical Therapeutic Chemical* (ATC) classification codes. Diabetes was categorized as gestational diabetes (ICD-8 codes: 634.74, Y6449; ICD-10 codes: O24.4, O24.9) or pregestational diabetes. Pregestational diabetes was ascertained using the following criteria: (1) an diagnosis of diabetes (ICD-8 codes: 249, 250; ICD-10 codes: E10-E11, H36.0, O24 excluding O24.4 and O24.9); (2) receipt of chiropody for diabetic patients; (3) two redeemed prescriptions for insulin (ATC code: A10A); or (4) two redeemed prescriptions for oral antidiabetics (ATC code: A10B). Blood glucose measurements were not used due to their poor validity.<sup>6</sup> Pregestational diabetes was further classified as type 1 diabetes (ICD-8 code: 249; ICD-10 codes: E10, O24.0; ATC code: A10A) or type 2 diabetes (ICD-8 code: 250; ICD-10 codes: E11, O24.1; ATC code: A10B). Pregestational diabetes was defined as the diagnosis of type 1 or type 2 diabetes before giving birth rather than before conception, because preexisting but unrecognized diabetes was likely to be identified and registered during pregnancy. Because diabetes was recorded using a single code (250) during 1977-1986, we used two approaches to distinguish between type 1 and type 2 diabetes during that period: 1) a specific code for type 1 or type 2 diabetes applied later in time; or 2) age of diabetes onset [cut-off for type 1: <30 years and cut-off for type 2:  $\geq 30$  years].<sup>11,12</sup> If a mother was diagnosed with multiple types of diabetes during one pregnancy, she was classified according to the first diagnosed type. Once a mother was diagnosed with a specific code for type 1 or type 2 diabetes, she retained this status for any subsequent pregnancy. A mother with gestational diabetes diagnosed in one pregnancy was not assumed to have gestational diabetes or preexisting diabetes in the future pregnancies unless a further diagnosis was made.

### **Appendix S3. Detailed description of covariates and multiple imputation**

Information on maternal and birth characteristics was retrieved from the Danish Medical Birth Register,<sup>2</sup> and socioeconomic factors were retrieved from the Danish Integrated Database for Longitudinal Labour Market Research and the Danish Civil Registry System.<sup>13</sup> Information on parental CVD history was obtained from the Danish National Patient Registry.<sup>10</sup> These included maternal age (<20, 20-24, 25-29, 30-34, or  $\geq 35$  years), parity (1, 2, or  $\geq 3$  children), maternal cohabitation (single or cohabitating), maternal education (0-9, 10-14, or  $\geq 15$  years), maternal residence (Copenhagen, cities with  $\geq 100,000$  inhabitants, or other), maternal smoking during pregnancy (yes or no), maternal and paternal CVD history before the birth of their child (yes or no). We also included singleton delivery (yes or no), sex of offspring (male or female), and calendar period of delivery (before 1980, or 5-year intervals during 1981-2010 or 2011-2016). Maternal age was included as a continuous covariate in the regression models using restricted cubic splines rather than categorization.

The frequency of missing data in our main analysis was relatively low: 0.04% for sex, 2.27% for maternal education, 0.14% for maternal cohabitation, and 0.30% for paternal history of CVD. 97.41% offspring have complete information for these covariates. The frequency of missing data for maternal smoking (data available since 1991) was 4.31%. Regarding the other variables used in this study, the frequency of missing data were 0.30% for maternal country of origin, 0.30% for paternal history of diabetes before childbirth, and 5.71% for maternal prepregnancy BMI (data available since 2004).

We imputed missing variables using the fully conditional specification (FCS) method in which logistic regression was used for categorical variables and predictive mean matching for continuous variables. The imputation model included the following variables: maternal diabetes during pregnancy (yes or no), offspring CVD (yes or no), maternal age (continuous variables), parity (1, 2, or  $\geq 3$  children), maternal cohabitation (single or cohabitating), maternal education (0-9, 10-14, or  $\geq 15$  years), maternal residence (Copenhagen, cities with  $\geq 100,000$  inhabitants, or other), maternal smoking during pregnancy (yes or no), maternal and paternal CVD history before the birth of their child (yes or no), maternal country of origin

(Nordic countries, others), paternal history of diabetes before childbirth (yes or no), singleton delivery (yes or no), sex of offspring (male or female), and calendar period of delivery (before 1980, or 5-year intervals during 1981-2010 or 2011-2016). As the data on maternal prepregnancy BMI was available since 2004, the imputation model for maternal prepregnancy BMI was only restricted to offspring born since 2004. The distributions of observed and imputed variables were similar.

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**Table S1. Definition of cardiovascular disease<sup>a</sup>**

	<b>ICD-8</b>	<b>ICD-10</b>	<b>Procedure/Surgery Codes</b>
Overall cardiovascular disease (CVD)	390-444.1, 444.3-458, 782.4	I00-I99	30350, 30354, 30240, KFNG, KFNF 30009, 30019, 30029, 30039, 30049, 30059, 30069, 30079, 30089, 30099, 30109, 30119, 30120, 30129, 30139, 30149, 30159, 30169, 30179, 30189, 30199, 30200, KFNA-KFNE, KFNH20
Ischemic heart disease	410-414	I20-I25	
Cerebrovascular disease	430-438	I60-I69	
Stroke	430-436	I61-I64	
Heart failure	427.0,427.1,782.4	I110, I130, I132, I50	
Atrial fibrillation	427.93, 427.94	I48	
Hypertensive disease	400-404	I10-I15	
Deep vein thrombosis	451.00	I80.1-I80.3	
Pulmonary embolism	450.99	I26	
Coronary artery bypass graft (CABG)			30009, 30019, 30029, 30039, 30049, 30059, 30069, 30079, 30089, 30099, 30109, 30119, 30120, 30129, 30139, 30149, 30159, 30169, 30179, 30189, 30199, 30200, KFNA-KFNE, KFNH20
Percutaneous coronary intervention (PCI)			30350, 30354, 30240, KFNG, KFNF
Other CVDs	Remainder of codes (390-444.1, 444.3-458, 782.4)	Remainder of codes (I00-I99)	Without the surgery codes above for PCI and CABG

<sup>a</sup> The information on cardiovascular disease is from the Danish National Patient Registry or the Danish Register of Cause of Death.



**Table S2. Baseline characteristics of offspring exposed *in utero* to maternal diabetes, in Denmark, 1977-2016**

Variable <sup>a</sup>	Exposure to type 1 diabetes (n=22 055)	Exposure to type 2 diabetes (n=6537)	Exposure to gestational diabetes (n=26 272)	Unexposed (n=2 377 136)
Singleton				
No	948 (4)	365 (6)	1554 (6)	75 294 (3)
Yes	21 107 (96)	6172 (94)	24 718 (94)	2 301 842 (97)
Sex				
Male	11 349 (51)	3370 (52)	13 715 (52)	1 219 022 (51)
Female	10 705 (49)	3163 (48)	12 553 (48)	1 157 052 (49)
Missing	1 (0)	4 (0)	4 (0)	1062 (0)
Maternal parity				
1	9222 (42)	2304 (35)	10 519 (40)	1 069 854 (45)
2	8421 (38)	2374 (36)	9320 (35)	882 200 (37)
≥3	4412 (20)	1859 (28)	6433 (24)	425 082 (18)
Maternal age at childbirth, years				
<20	188 (1)	58 (1)	156 (1)	59 566 (3)
20-24	2342 (11)	630 (10)	1 893 (7)	434 191 (18)
25-29	7020 (32)	1484 (23)	6754 (26)	869 159 (37)
30-34	7682 (35)	2097 (32)	9429 (36)	702 488 (30)
35+	4823 (22)	2268 (35)	8040 (31)	311 732 (13)
Maternal smoking during pregnancy <sup>b</sup>				
No	15 924 (80)	3 701 (76)	20 902 (81)	1 223 564 (77)
Yes	3194 (16)	903 (19)	3853 (15)	302 428 (19)
Missing	746 (4)	261 (5)	982 (4)	68 888 (4)
Maternal education at childbirth, years				
0-9	4178 (19)	2048 (31)	5697 (22)	637 947 (27)
10-14	9194 (42)	2599 (40)	11 601 (44)	1 015 220 (43)
15+	8356 (38)	1708 (26)	7613 (29)	670 697 (28)
Missing	327 (1)	182 (3)	1361 (5)	53 272 (2)
Maternal cohabitation at childbirth				
No	10 079 (46)	2573 (39)	10 935 (42)	1 054 960 (44)
Yes	11 968 (54)	3964 (61)	15 317 (58)	1 318 900 (55)
Missing	8 (<1)	0 (0)	20 (<1)	3276 (<1)
Maternal residence at childbirth				
Copenhagen	3061 (14)	901 (14)	2413 (9)	267 353 (11)
Big cities ≥100 000 inhabitants	2430 (11)	1012 (15)	3514 (13)	303 220 (13)
Others	16 564 (75)	4624 (71)	20 345 (77)	1 806 563 (76)
Maternal CVD history before childbirth				
No	20 648 (94)	6025 (92)	24 847 (95)	2 311 824 (97)
Yes	1407 (6)	512 (8)	1425 (5)	65 312 (3)
Paternal CVD history before birth of the child				
No	20 997 (95)	6 217 (95)	24 827 (94)	2 297 308 (97)
Yes	1043 (5)	303 (5)	1429 (5)	72 482 (3)
Missing	15 (<1)	17 (<1)	16 (<1)	7346 (<1)

<sup>a</sup> Expressed as frequency (percentage). Percentages have been rounded and may not total to 100.

<sup>b</sup> Maternal smoking during pregnancy was available from 1991 to 2016.

**Table S3. Incidence rates of cardiovascular risk factors among offspring according to the presence of maternal diabetes<sup>a</sup>**

Exposure	Cardiovascular risk factors among offspring									
	Diabetes		Chronic kidney disease		Hypertension		Hypercholesterol emia		Obesity	
	No. of cases	Rate per 1000 person-years	No. of cases	Rate per 1000 person-years	No. of cases	Rate per 1000 person-years	No. of cases	Rate per 1000 person-years	No. of cases	Rate per 1000 person-years
No diabetes	30 653	0.67	3522	0.08	8612	0.19	2395	0.05	69 827	1.53
Maternal diabetes	727	1.27	58	0.10	123	0.21	33	0.06	1138	1.99
Pregestational diabetes	606	1.75	40	0.11	90	0.26	27	0.08	719	2.07
Type 1	401	1.61	30	0.12	53	0.21	20	0.08	420	1.68
Type 2	205	2.10	10	0.10	37	0.37	7	0.07	299	3.08
Gestational diabetes	121	0.53	18	0.08	33	0.15	6	0.03	419	1.86

<sup>a</sup> Chronic kidney disease: (ICD-8 codes: 580.00, 582.00-584.99, 593.20; ICD-10 codes: N02.0-02.8, N03.0-03.9, N05.0-6.8, N07.0-8.8, N14.0-14.4, N18.0-18.9, I12.0); hypertension: (ICD-8 codes:400-404, 426; ICD-10 codes:I10-I15, I27); hypercholesterolemia: (ICD-8 codes:27200; ICD-10 codes:E780); obesity: (ICD-8 codes:277; ICD-10 codes:E66).

**Table S4. Associations between maternal diabetes and early CVD onset in offspring, by hierarchical ordering of diabetes types (type 1, type 2, and gestational diabetes)**

<b>Exposure</b>	<b>No. of CVD cases</b>	<b>Rate per 1000 person-years</b>	<b>HR (95% CI) Model 1</b>	<b>HR (95% CI) Model 2</b>
No diabetes	91 311	2.01	1.0 (ref)	1.0 (ref)
Maternal diabetes	1153	2.02	1.47 (1.39 to 1.56)	1.29 (1.21 to 1.37)
Pregestational diabetes	820	2.29	1.45 (1.35 to 1.56)	1.34 (1.25 to 1.43)
Type 1	589	2.11	1.46 (1.34 to 1.59)	1.31 (1.20 to 1.43)
Type 2	231	2.92	1.44 (1.27 to 1.62)	1.39 (1.23 to 1.57)
Gestational diabetes	333	1.55	1.51 (1.36 to 1.67)	1.19 (1.07 to 1.32)

Abbreviations: CVD, cardiovascular disease; HR, hazard ratio.

Model 1: Offspring' s age as time scale.

Model 2: Offspring' s age as time scale. Controlled for calendar year, sex, singleton status, parity, maternal smoking, maternal education, maternal cohabitation, maternal residence at birth, maternal history of CVD before childbirth, paternal history of CVD before birth of the child, and maternal age (restricted cubic spline with five knots at five evenly spaced).

**Table S5. Associations between maternal diabetes and early CVD onset after excluding offspring of mothers diagnosed with multiple types of diabetes in one pregnancy**

<b>Exposure</b>	<b>No. of CVD cases</b>	<b>Rate per 1000 person-years</b>	<b>HR (95% CI) Model 1</b>	<b>HR (95% CI) Model 2</b>
No diabetes	91 311	2.01	1.0 (ref)	1.0 (ref)
Maternal diabetes	1005	2.02	1.44 (1.35 to 1.53)	1.27 (1.19 to 1.35)
Pregestational diabetes	672	2.37	1.43 (1.32 to 1.54)	1.34 (1.24 to 1.44)
Type 1	462	2.14	1.43 (1.30 to 1.56)	1.29 (1.18 to 1.42)
Type 2	210	3.08	1.43 (1.25 to 1.64)	1.45 (1.26 to 1.66)
Gestational diabetes	333	1.55	1.47 (1.32 to 1.63)	1.15 (1.04 to 1.29)

Abbreviations: CVD, cardiovascular disease; HR, hazard ratio.

Model 1: Offspring' s age as time scale.

Model 2: Offspring' s age as time scale. Controlled for calendar year, sex, singleton status, parity, maternal smoking, maternal education, maternal cohabitation, maternal residence at birth, maternal history of CVD before childbirth, paternal history of CVD before birth of the child, and maternal age (restricted cubic spline with five knots at five evenly spaced).

**Table S6. Associations between maternal diabetes and early CVD onset in term-born offspring<sup>a</sup>**

<b>Exposure</b>	<b>No. of CVD cases</b>	<b>Rate per 1000 person-years</b>	<b>HR (95% CI) Model 1</b>	<b>HR (95% CI) Model 2</b>
No diabetes	73 360	1.89	1.0 (ref)	1.0 (ref)
Maternal diabetes	869	1.83	1.41 (1.32 to 1.50)	1.23 (1.15 to 1.32)
Pregestational diabetes	557	2.03	1.36 (1.25 to 1.48)	1.26 (1.16 to 1.37)
Type 1	372	1.88	1.39 (1.25 to 1.54)	1.24 (1.12 to 1.37)
Type 2	185	2.40	1.32 (1.14 to 1.52)	1.30 (1.12 to 1.50)
Gestational diabetes	312	1.56	1.49 (1.33 to 1.67)	1.19 (1.07 to 1.33)

Abbreviations: CVD, cardiovascular disease; HR, hazard ratio.

Model 1: Offspring' s age as time scale.

Model 2: Offspring' s age as time scale. Controlled for calendar year, sex, singleton status, parity, maternal smoking, maternal education, maternal cohabitation, maternal residence at birth, maternal history of CVD before childbirth, paternal history of CVD before birth of the child, and maternal age (restricted cubic spline with five knots at five evenly spaced).

<sup>a</sup> Term-born offspring: live-births with a gestational age  $\geq$  37 weeks.

**Table S7. Associations between maternal diabetes (type 1 and type 2) and early CVD onset in offspring, according to the timing of the maternal diabetes diagnosis**

<b>Timing of maternal diabetes diagnosis</b>	<b>No. of CVD cases</b>	<b>Rate per 1000 person-years</b>	<b>HR (95% CI) Model 1</b>	<b>HR (95% CI) Model 2</b>
<b>Maternal type 1 diabetes diagnosis</b>				
No diabetes diagnosed	87 826	1.99	1.0 (ref)	1.0 (ref)
Diagnosed before birth	462	2.10	1.53 (1.40 to 1.68)	1.35 (1.23 to 1.48)
Diagnosed $\leq 2$ years after birth	82	1.70	1.36 (1.10 to 1.69)	1.19 (0.96 to 1.48)
Diagnosed 2-5 years after birth	203	1.92	1.42 (1.23 to 1.63)	1.28 (1.11 to 1.46)
Diagnosed $> 5$ years after birth	3269	2.45	1.06 (1.03 to 1.10)	1.10 (1.06 to 1.13)
<b>Maternal type 1 and type 2 diabetes diagnosis</b>				
No diabetes diagnosed	82 464	1.96	1.0 (ref)	1.0 (ref)
Diagnosed before birth	766	2.28	1.45 (1.35 to 1.55)	1.34 (1.25 to 1.44)
Diagnosed $\leq 2$ years after birth	152	2.08	1.35 (1.15 to 1.58)	1.27 (1.09 to 1.49)
Diagnosed 2-5 years after birth	277	1.97	1.34 (1.19 to 1.51)	1.24 (1.10 to 1.39)
Diagnosed $> 5$ years after birth	8444	2.65	1.11 (1.08 to 1.13)	1.14 (1.12 to 1.17)

Abbreviations: CVD, cardiovascular disease; HR, hazard ratio.

Model 1: Offspring's age as time scale.

Model 2: Offspring's age as time scale. Controlled for calendar year, sex, singleton status, parity, maternal smoking, maternal education, maternal cohabitation, maternal residence at birth, maternal history of CVD before childbirth, paternal history of CVD before birth of the child, and maternal age (restricted cubic spline with five knots at five evenly spaced).

**Table S8. Associations between maternal diabetes and early CVD onset in offspring, with additional adjustment for parental factors<sup>a</sup>**

<b>Additional covariate</b>	<b>Exposure</b>	<b>HR (95% CI)<sup>b</sup></b>
<b>Maternal country of origin</b>	No diabetes	1.0 (ref)
	Maternal diabetes	1.29 (1.22 to 1.37)
	Pregestational diabetes	1.34 (1.25 to 1.43)
	Type 1	1.31 (1.20 to 1.43)
	Type 2	1.39 (1.24 to 1.58)
	Gestational diabetes	1.20 (1.08 to 1.33)
<b>Paternal diabetes before birth of the child</b>	No diabetes	1.0 (ref)
	Maternal diabetes	1.29 (1.21 to 1.36)
	Pregestational diabetes	1.34 (1.24 to 1.43)
	Type 1	1.31 (1.20 to 1.43)
	Type 2	1.39 (1.23 to 1.57)
	Gestational diabetes	1.19 (1.07 to 1.32)
<b>Maternal pre-pregnancy BMI<sup>c</sup></b>	No diabetes	1.0 (ref)
	Maternal diabetes	1.26 (1.13 to 1.40)
	Pregestational diabetes	1.35 (1.17 to 1.57)
	Type 1	1.31 (1.11 to 1.56)
	Type 2	1.52 (1.11 to 2.08)
	Gestational diabetes	1.17 (1.00 to 1.37)
<b>All three variables above</b>	No diabetes	1.0 (ref)
	Maternal diabetes	1.26 (1.13 to 1.41)
	Pregestational diabetes	1.36 (1.17 to 1.57)
	Type 1	1.31 (1.11 to 1.55)
	Type 2	1.53 (1.11 to 2.09)
	Gestational diabetes	1.18 (1.01 to 1.38)

Abbreviations: CVD, cardiovascular disease; HR, hazard ratio.

<sup>a</sup> As data on pre-pregnancy BMI was available only from 2004 to 2016, an analysis with additional adjustment for maternal pre-pregnancy BMI was restricted to offspring born during 2004-2016. Other analyses included offspring born during 1977-2016.

<sup>b</sup> Offspring's age as time scale. Controlled for calendar year, sex, singleton status, parity, maternal smoking, maternal education, maternal cohabitation, maternal residence at birth, maternal history of CVD before childbirth, paternal history of CVD before birth of the child, and maternal age (restricted cubic spline with five knots at five evenly spaced).

<sup>c</sup> Pre-pregnancy BMI was available from 2004 to 2016 and was included in the model using restricted cubic spline with five knots at five evenly spaced).

**Table S9. Associations between paternal diabetes and early CVD onset in offspring**

<b>Exposure</b>	<b>No. of CVD cases</b>	<b>Rate per 1000 person-years</b>	<b>HR (95% CI) Model 1</b>	<b>HR (95% CI) Model 2</b>
No paternal diabetes	92 025	2.01	1.0 (ref)	1.0 (ref)
Paternal diabetes	439	1.86	1.21 (1.10 to 1.32)	1.10 (1.00 to 1.20)
Type 1	321	1.95	1.20 (1.08 to 1.34)	1.12 (1.01 to 1.25)
Type 2	118	1.67	1.22 (1.02 to 1.46)	1.03 (0.86 to 1.23)

Abbreviations: CVD, cardiovascular disease; HR, hazard ratio.

Model 1: Offspring' s age as time scale.

Model 2: Offspring' s age as time scale. Controlled for calendar year, sex, singleton status, parity, maternal smoking, maternal education, maternal cohabitation, maternal residence at birth, maternal history of CVD before childbirth, paternal history of CVD before birth of the child, and maternal age (restricted cubic spline with five knots at five evenly spaced).



**Table S10. Sensitivity analysis of live-birth bias using inverse probability weighting**

<b>Exposure</b>	<b>No. of CVD cases</b>	<b>Rate per 1000 person-years</b>	<b>HR (95% CI) Model 1</b>	<b>HR (95% CI) Model 2</b>
No diabetes	91 311	2.01	1.0 (ref)	1.0 (ref)
Maternal diabetes	1153	2.02	1.47 (1.39 to 1.56)	1.29 (1.21 to 1.38)
Pregestational diabetes	792	2.28	1.45 (1.35 to 1.56)	1.35 (1.25 to 1.45)
Type 1	531	2.13	1.46 (1.34 to 1.59)	1.32 (1.21 to 1.45)
Type 2	261	2.68	1.44 (1.27 to 1.62)	1.41 (1.23 to 1.62)
Gestational diabetes	361	1.60	1.51 (1.36 to 1.67)	1.18 (1.05 to 1.32)

Abbreviations: CVD, cardiovascular disease; HR, hazard ratio.

Model 1: Offspring' s age as time scale.

Model 2: Offspring' s age as time scale. Controlled for calendar year, sex, singleton status, parity, maternal smoking, maternal education, maternal cohabitation, maternal residence at birth, maternal history of CVD before childbirth, paternal history of CVD before birth of the child, and maternal age (restricted cubic spline with five knots at five evenly spaced).

**Table S11. Subanalyses of the association between maternal diabetes and early CVD onset in offspring**

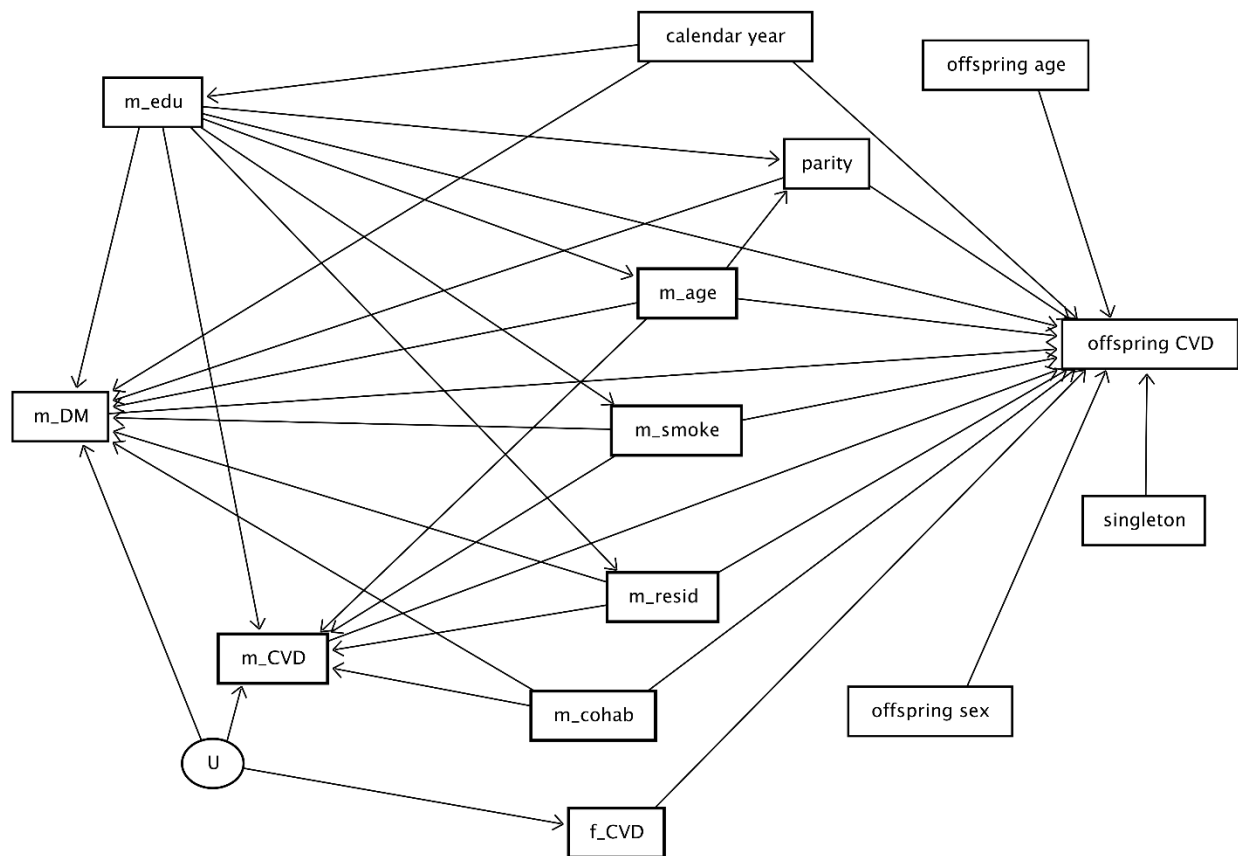
Sub-analysis	Exposure	No. Of CVD cases	Rate per 1000 person-years	HR (95% CI)
<b>Male offspring</b>	No diabetes	43 631	1.87	1.0 (ref)
	Maternal diabetes	595	2.02	1.27 (1.17 to 1.38)
	Pregestational diabetes	395	2.23	1.32 (1.20 to 1.46)
	Type 1	266	2.09	1.29 (1.15 to 1.46)
	Type 2	129	2.57	1.39 (1.17 to 1.65)
	Gestational diabetes	200	1.71	1.18 (1.03 to 1.36)
<b>Female offspring</b>	No diabetes	47 680	2.15	1.0 (ref)
	Maternal diabetes	558	2.01	1.30 (1.20 to 1.42)
	Pregestational diabetes	397	2.34	1.35 (1.22 to 1.49)
	Type 1	265	2.16	1.33 (1.17 to 1.50)
	Type 2	132	2.81	1.40 (1.18 to 1.66)
	Gestational diabetes	161	1.49	1.19 (1.02 to 1.39)
<b>Singleton offspring</b>	No diabetes	89 037	2.01	1.0 (ref)
	Maternal diabetes	1112	2.04	1.30 (1.23 to 1.38)
	Pregestational diabetes	770	2.32	1.35 (1.26 to 1.45)
	Type 1	517	2.16	1.33 (1.22 to 1.45)
	Type 2	253	2.71	1.40 (1.24 to 1.59)
	Gestational diabetes	342	1.61	1.20 (1.08 to 1.33)
<b>Primiparous women</b>	No diabetes	40 980	2.00	1.0 (ref)
	Maternal diabetes	461	2.08	1.31 (1.19 to 1.44)
	Pregestational diabetes	313	2.33	1.35 (1.21 to 1.51)
	Type 1	222	2.15	1.29 (1.13 to 1.48)
	Type 2	91	2.91	1.53 (1.24 to 1.87)
	Gestational diabetes	148	1.70	1.22 (1.04 to 1.44)
<b>Offspring born after 1991</b>	No diabetes	28 523	1.37	1.0 (ref)
	Maternal diabetes	730	1.66	1.28 (1.19 to 1.38)
	Pregestational diabetes	405	1.77	1.36 (1.23 to 1.50)
	Type 1	322	1.77	1.38 (1.24 to 1.54)
	Type 2	83	1.76	1.30 (1.05 to 1.61)
	Gestational diabetes	325	1.54	1.19 (1.07 to 1.33)
<b>Offspring born after 1994</b>	No diabetes	20 600	1.27	1.0 (ref)
	Maternal diabetes	660	1.61	1.27 (1.18 to 1.38)
	Pregestational diabetes	360	1.72	1.36 (1.23 to 1.51)
	Type 1	290	1.71	1.36 (1.21 to 1.53)
	Type 2	70	1.76	1.37 (1.08 to 1.73)
	Gestational diabetes	300	1.50	1.18 (1.06 to 1.33)
<b>Offspring born after 2004</b>	No diabetes	6118	1.24	1.0 (ref)
	Maternal diabetes	347	1.64	1.26 (1.13 to 1.41)
	Pregestational diabetes	178	1.77	1.36 (1.17 to 1.58)
	Type 1	139	1.71	1.31 (1.11 to 1.56)
	Type 2	39	2.01	1.52 (1.11 to 2.09)
	Gestational diabetes	169	1.53	1.17 (1.01 to 1.37)
<b>Complete case analysis</b>	No diabetes	26 607	1.36	1.0 (ref)

	Maternal diabetes	669	1.64	1.27 (1.17 to 1.37)
	Pregestational diabetes	372	1.74	1.34 (1.21 to 1.49)
	Type 1	298	1.74	1.36 (1.21 to 1.53)
	Type 2	74	1.72	1.27 (1.01 to 1.60)
	Gestational diabetes	297	1.52	1.19 (1.06 to 1.33)
<b>Missing indicator method</b>	No diabetes	91 311	2.01	1.0 (ref)
	Maternal diabetes	1153	2.02	1.29 (1.21 to 1.36)
	Pregestational diabetes	792	2.28	1.33 (1.24 to 1.43)
	Type 1	531	2.13	1.31 (1.20 to 1.43)
	Type 2	261	2.68	1.39 (1.23 to 1.57)
	Gestational diabetes	361	1.60	1.19 (1.07 to 1.32)
<b>Additional adjustment for LGA<sup>a</sup>, preterm birth and pre-eclampsia</b>	No diabetes	91 311	2.01	1.0 (ref)
	Maternal diabetes	1153	2.02	1.24 (1.16 to 1.31)
	Pregestational diabetes	792	2.28	1.27 (1.18 to 1.36)
	Type 1	531	2.13	1.24 (1.14 to 1.36)
	Type 2	261	2.68	1.33 (1.18 to 1.50)
	Gestational diabetes	361	1.60	1.16 (1.05 to 1.29)

Abbreviations: CVD, cardiovascular disease; HR, hazard ratio.

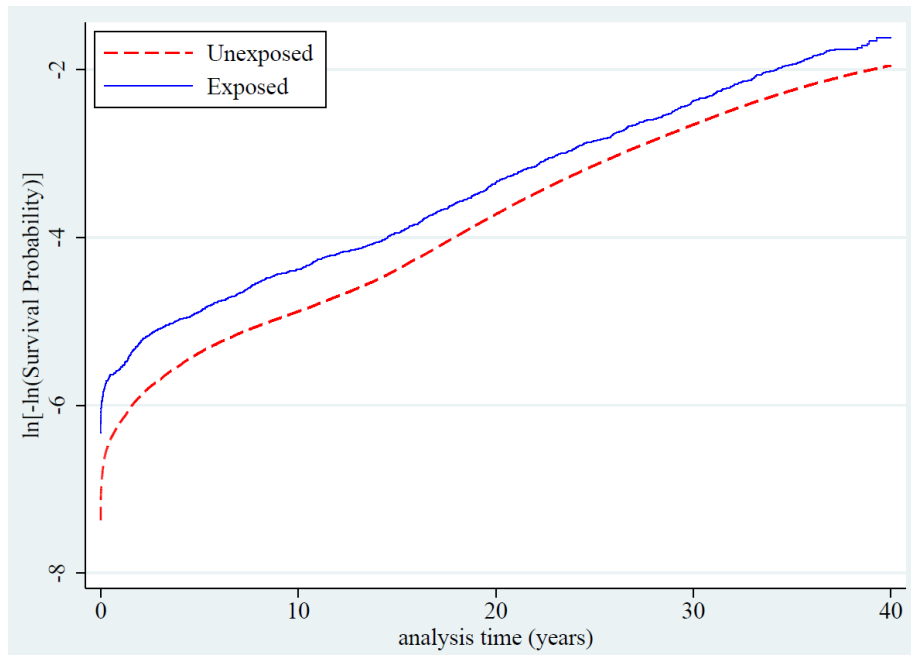
Offspring' s age as time scale. Controlled for calendar year, sex, singleton status, parity, maternal smoking, maternal education, maternal cohabitation, maternal residence at birth, maternal history of CVD before childbirth, paternal history of CVD before birth of the child, and maternal age (restricted cubic spline with five knots at five evenly spaced).

<sup>a</sup> LGA: large for gestational age (birthweight below the 10<sup>th</sup>, between 10<sup>th</sup> and 90<sup>th</sup>, above the 90<sup>th</sup> percentile for infants of the same gestational age, sex, and birth year).

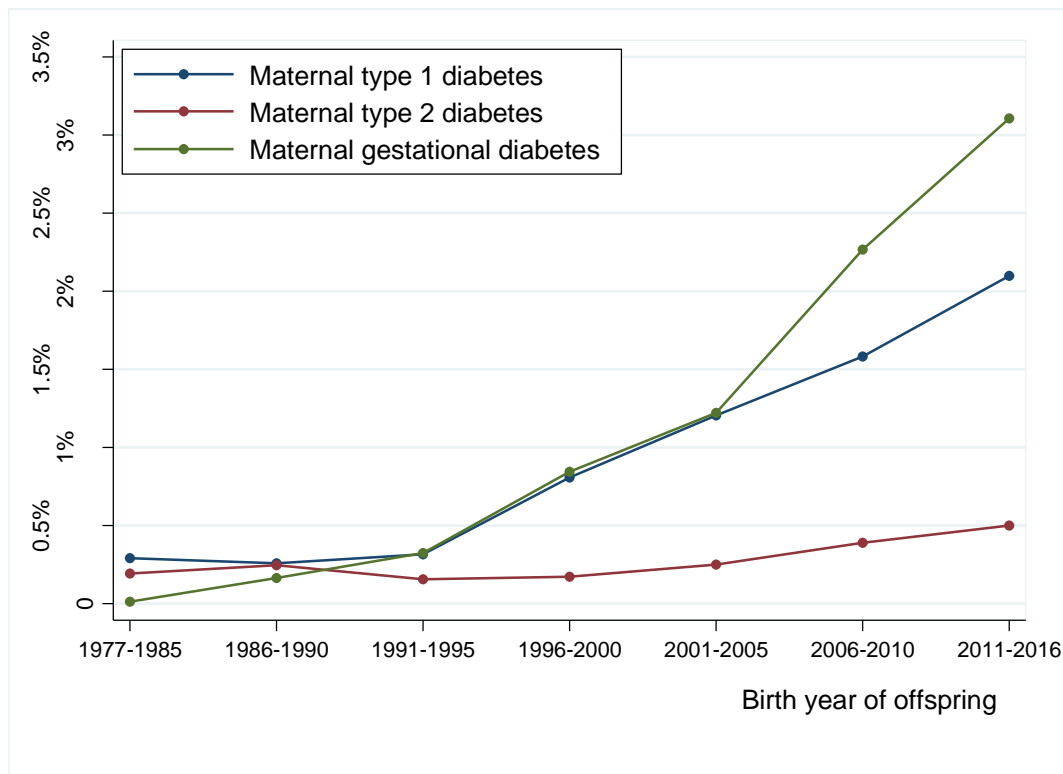


**Figure S1. Causal diagram showing selection of covariates for confounding control<sup>a</sup>**

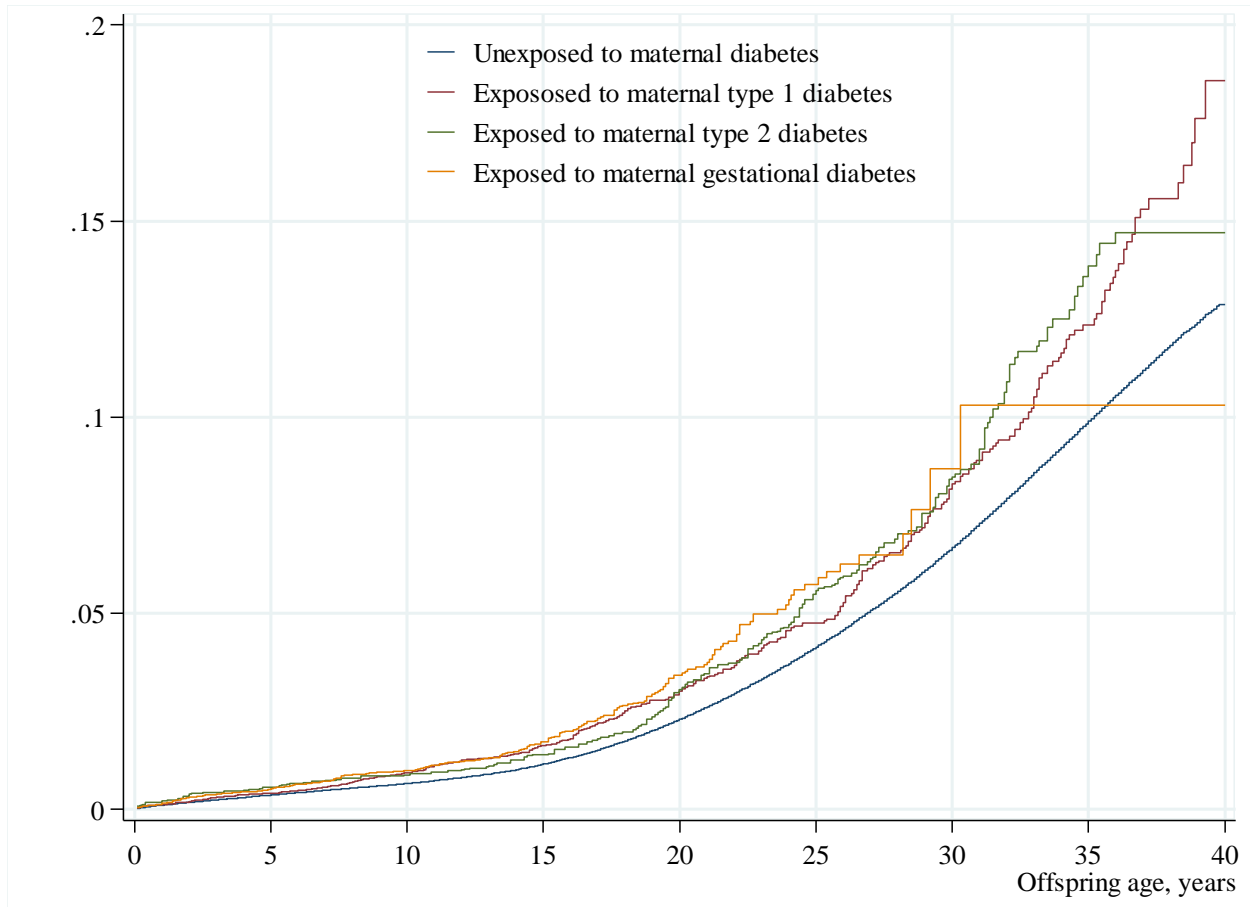
<sup>a</sup> m\_DM: maternal diabetes, m\_age: maternal maternal age, m\_smoke: maternal smoking, m\_edu: maternal education, m\_cohab: maternal cohabitation, m\_resid: maternal residence at birth, m\_CVD: maternal history of CVD before childbirth, f\_CVD: paternal history of CVD before birth of the child, U: unmeasured variable



**Figure S2. The log-minus-log survival curve**



**Figure S3. The proportion of offspring born to mothers with diabetes, by birth years and types of maternal diabetes**



Number at risk									
Unexposed	2 377 136	2 062 027	1 759 037	1 450 866	1 127 219	787 639	490 892	246 601	0
Type 1	22 055	15 437	10 295	6323	3408	2160	1408	628	0
Type 2	6537	4924	3616	2769	2144	1606	927	360	0
GDM	26 272	16 598	9050	4724	2039	603	59	10	0

**Figure S4. Adjusted cumulative incidence of early CVD onset among offspring, exposed to maternal diabetes versus unexposed<sup>a</sup>**

<sup>a</sup> Adjusted cumulative incidence averaged across the distribution of the covariates (calendar year, sex, singleton status, parity, age, smoking, education, cohabitation, residence at childbirth, history of CVD before childbirth, and paternal history of CVD before childbirth) using the inverse probability of treatment weighting approach. aternal diabetes.