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Supplementary Table 1. The follow-up rate by year of visit

year of visit	Loss of follow-up (number)	Follow-up (number)	Follow-up rate (%)
2015	1,209	30,076	96.1
2016	2,518	19,026	88.3
2017	1,535	7,797	83.6
2018	3,671	5,649	60.6
2019	7,989	1,849	18.8

Overall follow up rate was 79.2%

Supplementary Table 2. Baseline characteristics of the study participants by Follow-up

Characteristic	Follow-up loss	Follow-up	<i>P</i> value	sd
Number	8,933 (12.2%)	64,397 (87.8%)		
Age (years) ^a	39.9 (6.3)	38.3 (4.7)	<0.001	0.275
Current smoker (%)	1.6	0.9	<0.001	0.056
Alcohol intake (%) ^b	9.1	8.5	0.096	0.019
HEPA (%)	12.2	11.5	0.047	0.022
Higher education (%) ^c	82.1	85.1	<0.001	0.080
Diabetes (%)	0.8	0.5	<0.001	0.045
Hypertension (%)	3.0	1.9	<0.001	0.067
History of CVD (%)	0.6	0.5	0.154	0.016
Lipid-lowering drug use (%)	0.8	0.4	<0.001	0.046
History of GDM (%)	6.1	7.3	<0.001	0.046
Early menarche (%)	6.7	6.5	0.380	0.010
Metabolic syndrome (%)	1.5	1.2	0.046	0.022
Obesity (%) [‡]	9.0	7.6	<0.001	0.050
BMI (kg/m ²)	21.4 (2.6)	21.3 (2.5)	<0.001	0.050
Waist circumference (cm)	74.0 (6.8)	73.9 (6.7)	0.030	0.024
Systolic BP (mmHg) ^a	102.7 (10.5)	101.3 (9.5)	<0.001	0.137
Diastolic BP (mmHg) ^a	65.7 (8.3)	64.5 (7.6)	<0.001	0.158
Glucose (mg/dl) ^a	91.1 (8.6)	90.8 (8.3)	0.003	0.033
Total cholesterol (mg/dl) ^a	184.0 (31.0)	182.1 (29.7)	<0.001	0.063
LDL-C (mg/dl) ^a	115.3 (28.5)	111.0 (27.1)	<0.001	0.156
HDL-C (mg/dl) ^a	68.9 (15.2)	68.1 (14.8)	<0.001	0.052

Data are expressed as ^ameans (standard deviations) or percentages.

Abbreviations: HEPA, health enhancing physical activity; CVD, cardiovascular disease; GDM, gestational diabetes mellitus; BMI, body mass index; BP, blood pressure; LDL-C, low-density lipoprotein cholesterol; HDL-C, high-density lipoprotein cholesterol ; GDM, gestational diabetes mellitus; sd, standardized difference

^b ≥ 10 g of ethanol per day; ^c ≥ college graduate

Supplementary Table 3. Development of nonalcoholic fatty liver disease by history of gestational diabetes mellitus at baseline after further adjustment for potential confounders (n = 64,397)

Gestational diabetes mellitus	Multivariable-adjusted HR* (95% CI)			
	Model 1	Model 2	Model 3	Model 4
All NAFLD				
No	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)
Yes	1.36 (1.25-1.48)	1.34 (1.23-1.46)	1.36 (1.24-1.49)	1.32 (1.20-1.44)
Moderate-to-severe NAFLD				
No	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)
Yes	1.82 (1.33-2.5)	1.73 (1.26-2.38)	1.62 (1.16-2.28)	1.58 (1.12-2.21)

* Estimated from Cox proportional hazards models.

Multivariable model 1 was adjusted for age, center, examination year, alcohol consumption, smoking status, physical activity level, education level, BMI, history of hypertension, history of CVD, lipid-lowering drug use, age at first pregnancy, waist circumference and triglyceride

Multivariable model 2 was adjusted for age, center, examination year, alcohol consumption, smoking status, physical activity level, education level, BMI, history of hypertension, history of CVD, lipid-lowering drug use, age at 1st pregnancy, total cholesterol, HDL-C and triglyceride

Multivariable model 3 was adjusted for age, center, examination year, alcohol consumption, smoking status, physical activity level, education level, BMI, history of hypertension, history of CVD, lipid-lowering drug use, age at first pregnancy, eGFR and hsCRP

Multivariable model 4 was adjusted for age, center, examination year, alcohol consumption, smoking status, physical activity level, education level, BMI, history of hypertension, history of CVD, lipid-lowering drug use, age at first pregnancy, waist circumference, total cholesterol, HDL-C, triglyceride, eGFR and hs-CRP

Abbreviations: CI, confidence interval; HR, hazard ratio; NAFLD, nonalcoholic fatty liver disease

Supplementary Table 4. Mediation analysis of the association between history of gestational diabetes mellitus at baseline and development of nonalcoholic fatty liver disease (n = 64,397)

Gestational diabetes mellitus	Excess relative risk* (95% CI) by potential mediators				
	BMI	Waist circumference	eGFR	hs-CRP [§]	Metabolic syndrome
All NAFLD					
Controlled direct effect (CDE) [†]	0.34 (0.23-0.45)	0.39 (0.34-0.53)	0.37 (0.25-0.49)	0.37 (0.25-0.49)	0.37 (0.25-0.50)
Reference interaction	0.06 (0.01-0.11)	0.01 (▼0.002-0.018)	0.01 (▼0.01-0.02)	0.01 (▼0.01-0.02)	0.001 (▼0.002-0.004)
Mediated interaction	0.01 (▼0.002-0.013)	0.01 (0.001-0.009)	0.01 (▼0.002-0.013)	0.01 (▼0.002-0.013)	0.001 (▼0.002-0.004)
Pure indirect effect	0.02 (▼0.003-0.040)	0.01 (0.01-0.02)	0.01 (0.002-0.009)	0.01 (0.002-0.009)	0.001 (0.0003-0.002)
Total effect	0.43 (0.30-0.55)	0.42 (0.27-0.56)	0.39 (0.27-0.51)	0.39 (0.27-0.51)	0.38 (0.25-0.50)
Proportion mediated [‡]	0.06 (▼0.01-0.12)	0.05 (0.02-0.08)	0.03 (0.004-0.050)	0.03 (0.004-0.050)	0.01 (▼0.002-.01)
Moderate-to-severe NAFLD					
Controlled direct effect (CDE) [†]	0.62 (0.06-1.18)	0.58 (▼0.16-1.33)	0.84 (0.25-1.44)	0.63 (▼0.02-1.28)	0.87 (0.23-1.51)
Reference interaction	0.25 (0.05-0.45)	0.04 (▼0.003-0.086)	▼0.01 (▼0.05-0.04)	0.02 (▼0.09-0.13)	0.001 (▼0.011-0.012)
Mediated interaction	0.02 (▼0.01-0.04)	0.02 (0.003-0.029)	▼0.0002 (▼0.03-0.03)	0.01 (▼0.01-0.03)	0.001 (▼0.01-0.01)
Pure indirect effect	0.02 (▼0.004-0.048)	0.01 (0.01-0.02)	0.01 (▼0.0001-0.02)	0.02 (0.004-0.030)	0.01 (0.001-0.01)
Total effect	0.91 (0.25-1.58)	0.65 (▼0.09-1.39)	0.85 (0.26-1.43)	0.67 (0.05-1.29)	0.88 (0.24-1.51)
Proportion mediated [‡]	0.04 (▼0.01-0.10)	0.05 (▼0.01-0.10)	0.01 (▼0.03-0.05)	0.03 (▼0.01-0.08)	0.01 (▼0.01-0.02)

* Estimated from Stata command *med4way*. The regression model for the outcome was a Cox proportional hazard model. The regression model for the mediator were logistic regression model for metabolic syndrome and linear regression for BMI, waist circumference, eGFR or hsCRP. The following potential confounders were included in models: age, center, examination year, alcohol consumption, smoking status, physical activity level, education level, BMI, history of hypertension, history of CVD, lipid-lowering drug use and age at first pregnancy

† The CDE was estimated at a fixed level of the mediator (at non-diabetes status or at the mean level of HOMA-IR)

‡ Proportion mediated provides an estimate of the proportion of the total GDM effect that acts through its association with the potential mediator. Indirect effect was the relative risk due to mediated interaction and pure indirect effect.

§ among 59,219 subjects with available hs-CRP data

▼ negative

Abbreviations: BMI, body mass index; CI, confidence interval; eGFR, estimated glomerular filtration rate; hs-CRP, high-sensitivity C-reactive protein; NAFLD, nonalcoholic fatty liver disease

Supplementary Table 5. Mediation analysis of the association between history of gestational diabetes mellitus at baseline and development of nonalcoholic fatty liver disease (n = 64,397)

Gestational diabetes mellitus	Excess relative risk* (95% CI) by potential mediators			
	Total cholesterol	LDL-C	HDL-C	triglyceride
All NAFLD				
Controlled direct effect (CDE) [†]	0.38 (0.26-0.50)	0.36 (0.24-0.49)	0.33 (0.20-0.45)	0.33 (0.21-0.45)
Reference interaction	▼0.001 (▼0.10-0.01)	0.002 (▼0.10-0.02)	0.03 (▼0.01-0.07)	0.02 (▼0.01-0.05)
Mediated interaction	0.002 (▼0.01-0.01)	0.01 (▼0.01-0.02)	0.01 (▼0.001-0.01)	0.01 (0.001-0.02)
Pure indirect effect	0.01 (0.01-0.02)	0.02 (0.01-0.03)	0.01 (0.003-0.022)	0.03 (0.02-0.04)
Total effect	0.39 (0.27-0.51)	0.39 (0.27-0.51)	0.38 (0.25-0.50)	0.39 (0.27-0.51)
Proportion mediated [‡]	0.03 (0.01-0.06)	0.07 (0.03-0.10)	0.05 (0.01-0.09)	0.10 (0.05-0.15)
Moderate-to-severe NAFLD				
Controlled direct effect (CDE) [†]	0.82 (0.22-1.42)	0.85 (0.23-1.48)	0.96 (0.27-1.66)	1.04 (0.32-1.76)
Reference interaction	0.01 (▼0.07-0.09)	▼0.0001 (▼0.07-0.07)	▼0.03 (▼0.15-0.09)	▼0.06 (▼0.17-0.04)
Mediated interaction	0.01 (▼0.03-0.05)	0.01 (▼0.04-0.06)	0.0004 (▼0.02-0.02)	▼0.003 (▼0.04-0.03)
Pure indirect effect	0.02 (0.01-0.03)	0.03 (0.01-0.04)	0.02 (0.003-0.03)	0.04 (0.02-0.06)
Total effect	0.86 (0.26-1.45)	0.89 (0.28-1.50)	0.95 (0.30-1.60)	1.02 (0.33-1.70)
Proportion mediated [‡]	0.04 (▼0.01-0.08)	0.04 (▼0.02-0.10)	0.02 (▼0.01-0.05)	0.04 (▼0.01-0.08)

* Estimated from Stata command *med4way*. The regression model for the outcome was a Cox proportional hazard model. The regression model for the mediator was linear regression for total cholesterol, LDL- cholesterol, HOMA-IR. The following potential confounders were included in models: age, center, examination year, alcohol consumption, smoking status, physical activity level, education level, BMI, history of hypertension, history of CVD, and lipid-lowering drug use

[†] The CDE was estimated at a fixed level of the mediator (at the mean level of each potential mediator)

[‡] Proportion mediated provides an estimate of the proportion of the total GDM effect that acts through its association with the potential mediator. Indirect effect was the relative risk due to mediated interaction and pure indirect effect.

▼negative

Abbreviations: BMI, body mass index; CI, confidence interval; LDL-C, low-density lipoprotein cholesterol; HDL-C, high-density lipoprotein cholesterol; NAFLD, nonalcoholic fatty liver disease

Supplementary Table 6. Development of nonalcoholic fatty liver disease (all cases) and moderate-to-severe NAFLD by the history of gestational diabetes mellitus, after exclusion of participants who developed type 2 diabetes during follow-up

	Multivariable-adjusted HR* (95% CI)	
	Among women with glucose level of <100 mg/dl (n =58,274)	After excluding 1,282 cases of either prevalent diabetes or incident diabetes during follow-up (n = 63,593)
All NAFLD		
No GDM	1.00 (reference)	1.00 (reference)
GDM	1.28 (1.16-1.42)	1.31 (1.19-1.43)
Moderate-to-severe NAFLD		
No GDM	1.00 (reference)	1.00 (reference)
GDM	1.18 (0.74-1.88)	1.48 (1.004-2.18)

* Estimated from Cox proportional hazards models. The multivariable model was adjusted for age, center, examination year, alcohol consumption, smoking status, physical activity level, education level, BMI, history of hypertension, history of CVD, lipid-lowering drug use and age at first pregnancy. Abbreviations: CI, confidence interval; HR, hazard ratio; NAFLD, nonalcoholic fatty liver disease; GDM, gestational diabetes mellitus

Supplementary Table 7. Development of nonalcoholic fatty liver disease (all cases) and moderate-to-severe NAFLD by the history of gestational diabetes mellitus according to age

	Multivariable-adjusted HR* (95% CI)			P value [†]
	Age <35 years (n = 17,434)	Age 35-39 years (n = 23,036)	Age ≥40 years (n = 23,927)	
All NAFLD				0.571
No GDM	1.00 (reference)	1.00 (reference)	1.00 (reference)	
GDM	1.48 (1.23-1.78)	1.31 (1.13-1.52)	1.41 (1.23-1.61)	
Moderate-to-severe NAFLD				0.365
No GDM	1.00 (reference)	1.00 (reference)	1.00 (reference)	
GDM	1.95 (1.08-3.53)	2.38 (1.43-3.96)	1.38 (0.78-2.43)	

* Estimated from Cox proportional hazards models. The multivariable model was adjusted for age, center, examination year, alcohol consumption, smoking status, physical activity level, education level, BMI, history of hypertension, history of CVD, lipid-lowering drug use and age at first pregnancy. Abbreviations: CI, confidence interval; HR, hazard ratio; NAFLD, nonalcoholic fatty liver disease; GDM, gestational diabetes mellitus

[†] P for interaction

Supplementary Table 8. Development of nonalcoholic fatty liver disease by history of gestational diabetes mellitus at baseline with consideration of 3-year and 5-year look-back period.

Gestational diabetes mellitus	Multivariable-adjusted HR* (95% CI)			
	Including prevalent NAFLD in the 'look-back' period		Excluding prevalent NAFLD in the 'look-back' period	
	Model 1 (‘3 year’)	Model 2 (‘5 year’)	Model 3 (‘3 year’)	Model 4 (‘5 year’)
All NAFLD				
No	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)
Yes	1.39 (1.27-1.51)	1.39 (1.27-1.52)	1.35 (1.23-1.48)	1.34 (1.21-1.48)
Moderate-to-severe NAFLD				
No	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)
Yes	1.85 (1.35-2.54)	1.86 (1.35-2.55)	1.97 (1.28-2.81)	2.08 (1.45-2.99)

* Estimated from Cox proportional hazards models.

Multivariable model 1 was adjusted for age, center, examination year, alcohol consumption, smoking status, physical activity level, education level, BMI, age at first pregnancy and history of hypertension, history of CVD and lipid-lowering drug use for at least 3 years prior to the index

Multivariable model 2 was adjusted for age, center, examination year, alcohol consumption, smoking status, physical activity level, education level, BMI, age at first pregnancy and history of hypertension, history of CVD and lipid-lowering drug use for at least 5 years prior to the index

Multivariable model 3 was adjusted for age, center, examination year, alcohol consumption, smoking status, physical activity level, education level, BMI, age at first pregnancy and history of hypertension, history of CVD and lipid-lowering drug use for at least 3 years prior to the index after further excluding 1,470 subjects with history of fatty liver for at least 3 years prior to the index

Multivariable model 4 was adjusted for age, center, examination year, alcohol consumption, smoking status, physical activity level, education level, BMI, age at first pregnancy and history of hypertension, history of CVD and lipid-lowering drug use for at least 5 years prior to the index after further excluding 2,134 subjects with history of fatty liver for at least 5 years prior to the index

Abbreviations: CI, confidence interval; HR, hazard ratio; NAFLD, nonalcoholic fatty liver disease

Supplementary Figure 1. Forest plot of nonalcoholic fatty liver disease development according to the history of gestational diabetes mellitus in clinically relevant subgroups

Estimated from Cox proportional hazards models. The multivariable model was adjusted for age, center, examination year, age at first birth, alcohol consumption, smoking status, physical activity level, education level, history of hypertension, history of CVD, and lipid-lowering drug use.

Abbreviations: BMI, body mass index; CI, confidence interval; GDM, gestational diabetes mellitus; BP, blood pressure; HDL, high-density lipoprotein cholesterol; HOMA-IR, homeostatic model assessment of insulin resistance; hs-CRP, high-sensitivity C-reactive protein.

