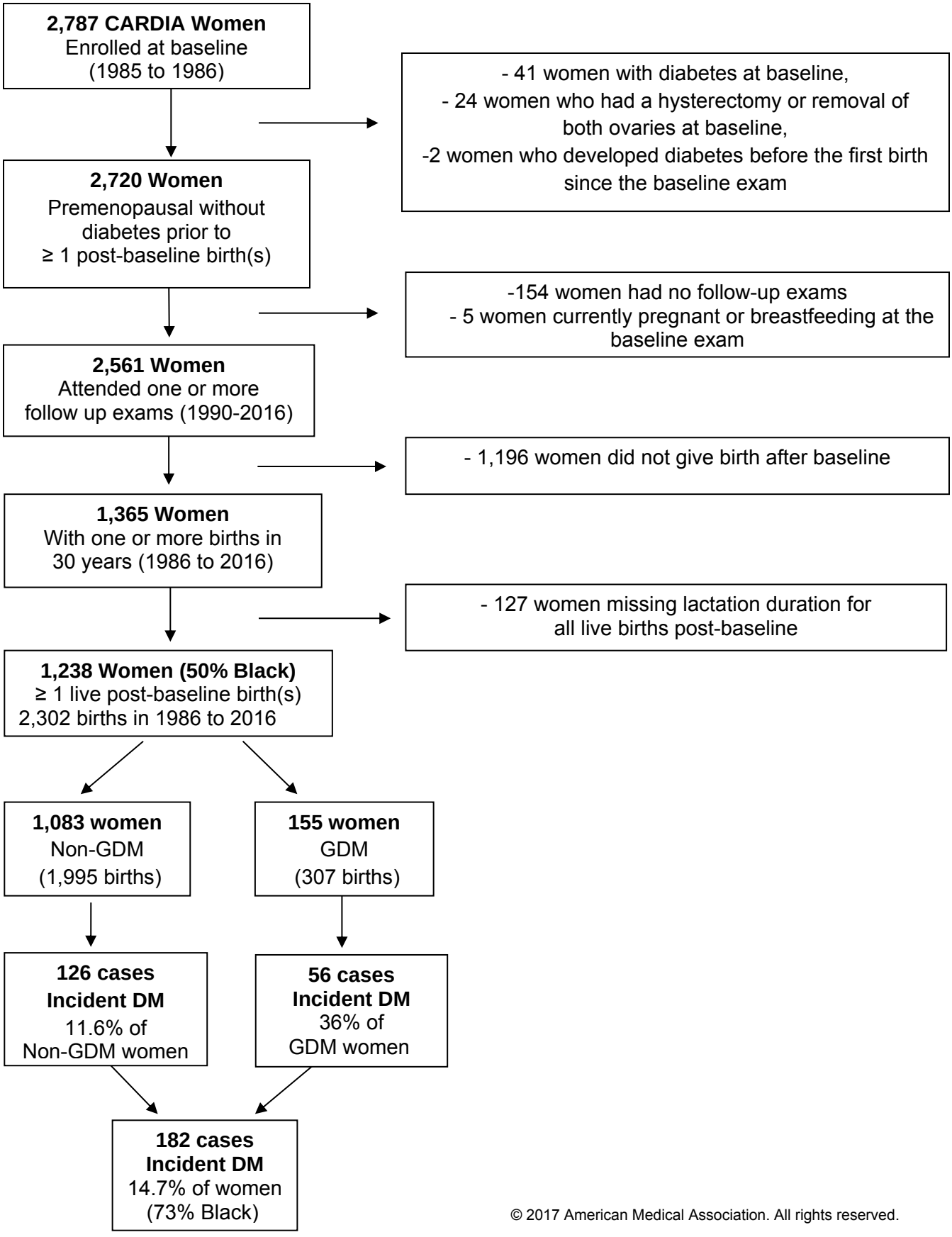
Supplementary Online Content

Gunderson EP, Lewis CE, Lin Y, et al. Lactation duration and progression to diabetes in women across the childbearing years: the 30-year CARDIA Study. *JAMA Intern Med*. Published online January 16, 2018. doi:10.1001/jamainternmed.2017.7978

eFigure 1. Sample Selection Flow diagram: 1,238 of 2,787 CARDIA Black and White women aged 18 to 30 years at baseline, and without diabetes prior to one or more live, post-baseline births during the 30-Year follow-up (1986 to 2016) and cases of incident diabetes.
eFigure 2. Mean weight gain (kg) from baseline to end of follow-up (1986-2016; 30 years) among lactation categories and by incident diabetes status (Incident diabetes n =182, No diabetes n =1,156). Mean weight gain associated with lactation duration categories (p-value<0.001) did not differ for women with incident diabetes and without diabetes (p-interaction=0.99).
eFigure 3. Unadjusted and fully adjusted associations for covariates with the relative hazards of incident diabetes during the 30-year follow up period (1986-2016).
eTable 1. Baseline Characteristics (1985-1986) by Lactation Duration Categories (n=1,238)
eTable 2. Characteristics by Lactation Duration Categories (n =1,238 parous women) during the 30-Year Follow Up (1986 to 2016).
eTable 3. Unadjusted and Adjusted Relative Hazards (95%CI) of Incident Type 2 Diabetes during 30 Years of Follow up Among Lactation Duration Categories on Women Nulliparous at Baseline (n=848 total nulliparous women)
eTable 4. Unadjusted and Adjusted Relative Hazards (95%CI) of Incident Diabetes in Women per month of Lactation during 30-Year Follow up for All Women, and Stratified by Black Women and White Women. (Interaction p-value = 0.137)

This supplementary material has been provided by the authors to give readers additional information about their work.

Supplemental Figure 1: Sample Selection Flow diagram: 1,238 of 2,787 CARDIA Black and White women aged 18 to 30 years at baseline, and without diabetes prior to one or more live, post-baseline births during the 30-Year follow-up (1986 to 2016) and cases of incident diabetes.



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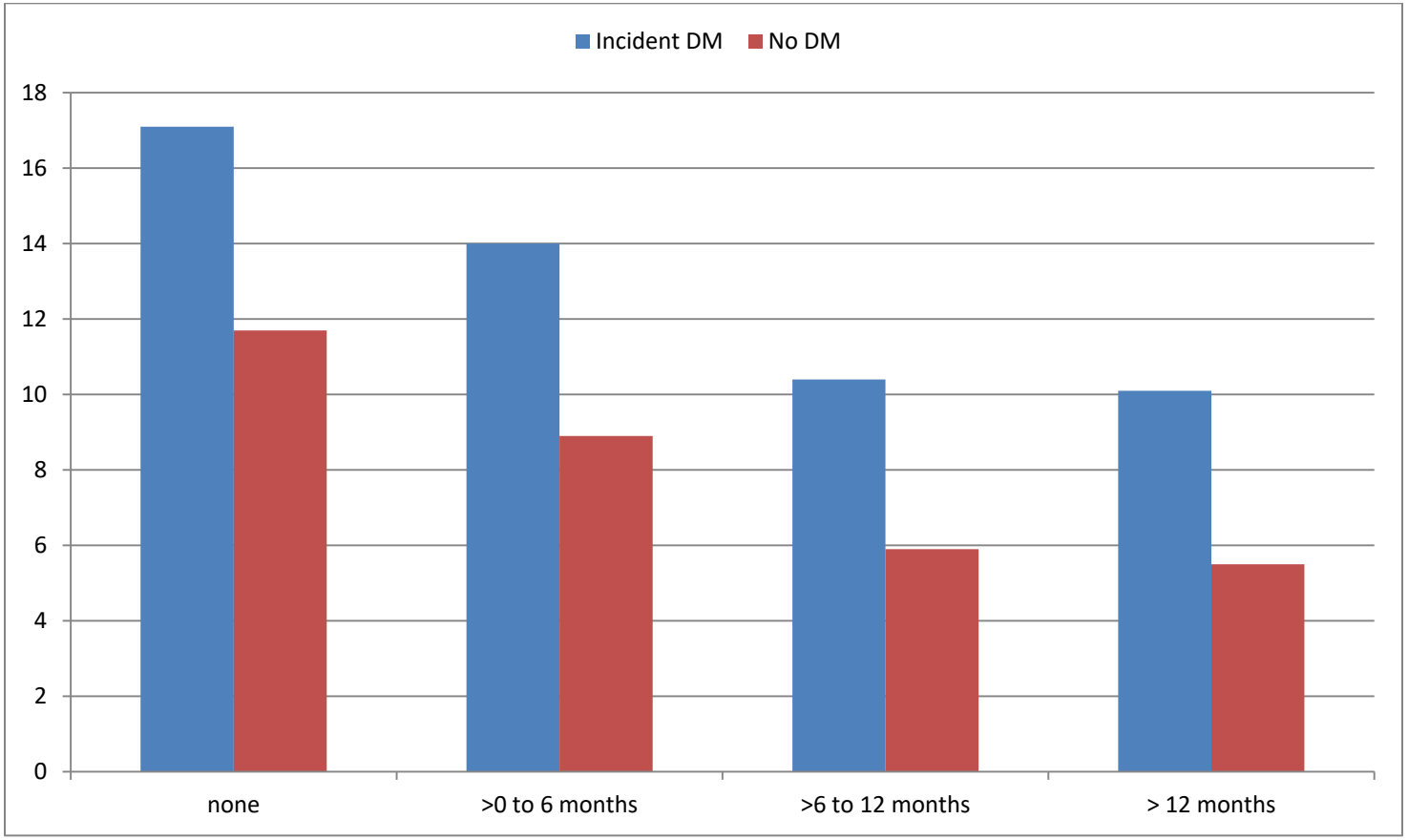

Supplemental Figure 3: Unadjusted and fully adjusted associations for covariates with the relative hazards of incident diabetes during the 30-year follow up period (1986-2016).

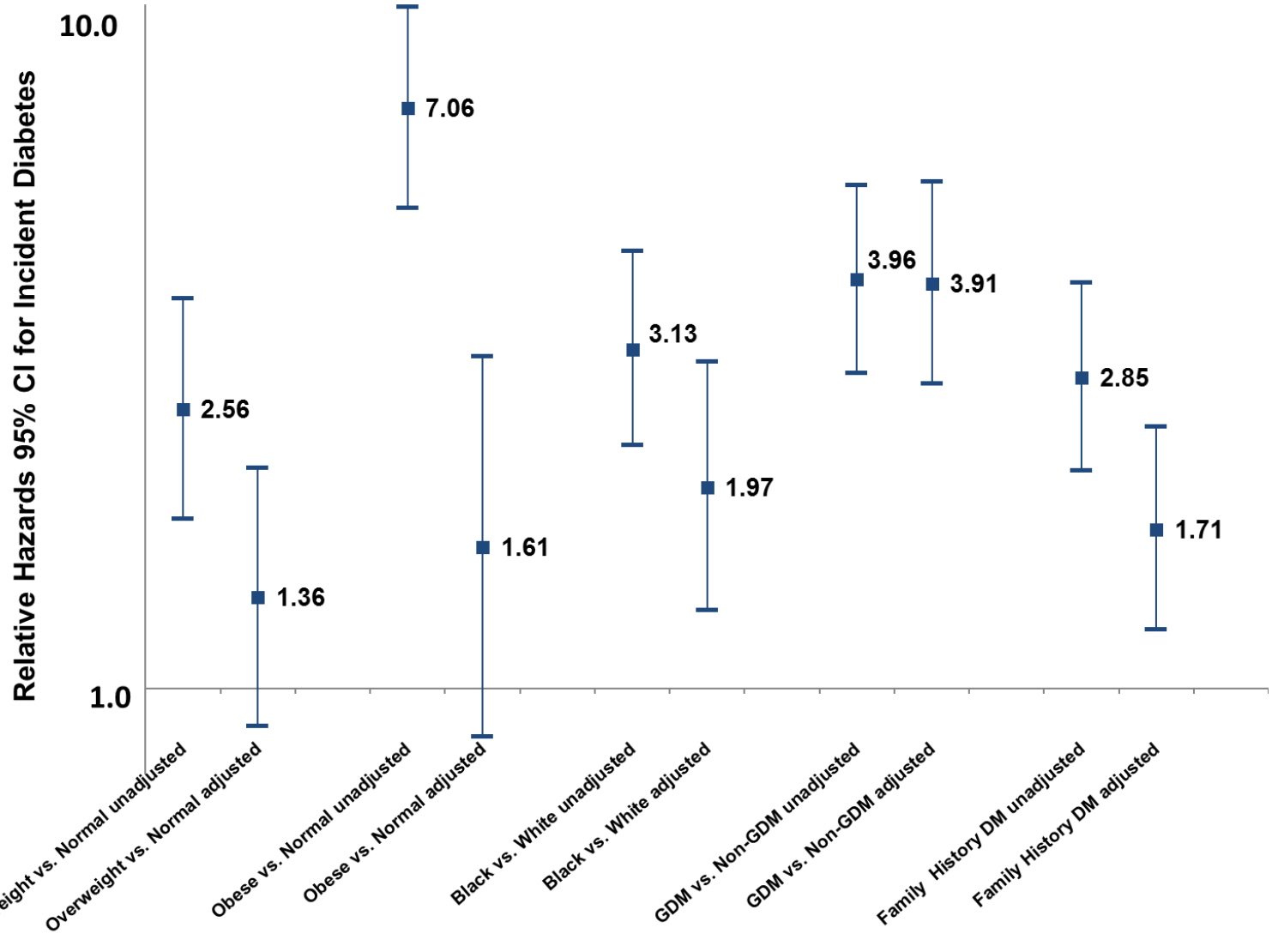

Table 1: Baseline Characteristics (1985-1986) by Lactation Duration Categories (n=1,238)

Baseline Characteristics		Lactation Duration Groups None (n=322)	>0 to 6 months (n=418)	>6 to <12 months (n=268)	≥ 12 months (n=230)	p-value
				n (row %)		
Race (Black)		252 (78.3)	215 (51.4)	93 (34.7)	55 (23.9)	<.001
Parity (Nulliparous)		184 (57.1)	141 (33.7)	66 (24.6)	44 (19.1)	<.001
Smoker (current)		123 (38.2)	106 (25.4)	51 (19.0)	39 (17.0)	<.001
				Mean (SD)		
Age (years)		23.4 (3.6)	24.2 (3.7)	24.4 (3.6)	24.4 (3.8)	0.001
Age at menarche (years)		12.5 (1.6)	12.5 (1.6)	12.6 (1.5)	12.9 (1.7)	0.05
BMI (kg/m^2)		25.3 (6.3)	23.6 (4.7)	23.3 (4.4)	22.2 (3.7)	<.001
Waist circumference (cm)		75.9 (12.7)	72.1 (9.5)	71.1 (9.0)	69.7 (7.6)	<.001
Systolic blood pressure (mm Hg)		106.5 (9.7)	105.7 (8.5)	105.2 (9.3)	104.9 (9.1)	0.19
Diastolic blood pressure (mm Hg)		66.1 (9.1)	65.8 (8.7)	65.4 (8.1)	66.3 (8.3)	0.66
Fasting mg/dL,	Glucose	78.5 (8.3)	79.3 (7.8)	80.3 (7.2)	79.4 (7.4)	0.06
	HDL-C	53.8 (12.9)	56.0 (12.2)	58.0 (13.2)	57.6 (12.4)	<.001
	LDL-C	112.2 (31.0)	107.3 (30.9)	108.3 (28.3)	103.5 (28.5)	0.01
	Total Cholesterol	179.6 (33.6)	176.3 (32.7)	179.2 (31.5)	173.3 (30.0)	0.10
	Triglycerides	68.3 (33.0)	64.7 (28.9)	64.2 (46.9)	61.0 (26.9)	0.11
Dietary Intake:						
% Energy (Kcal) from CHO		46.5 (7.8)	47.0 (7.1)	47.0 (7.0)	47.4 (7.6)	0.50
% Energy (Kcal) from Fat		38.4 (6.0)	37.4 (5.9)	36.8 (6.2)	36.4 (6.1)	<.001
Dietary Quality Score		55.6 11.1)	64.6 (12.6)	68.9 (12.7)	69.5 (13.3)	<.001
				Median (IQR)		
HOMA-IR †		1.9 (1.7)	1.8 (1.3)	1.6 (1.3)	1.5 (1.2)	<.001
Crude Fiber (g)/1000 Kcal †		1.8 (0.8)	2.3 (1.1)	2.4 (1.0)	2.7 (1.4)	<.001
Alcohol Intake (ml/day) †		2.4 (7.9)	2.4 (7.8)	2.4 (10.6)	2.4 (9.7)	0.11
Physical activity score †		233.0 (305.0)	291.0 (320.0)	350.5 (348.5)	360.0 (336.0)	<.001

† Kruskal-Wallis test; CHO = carbohydrate, Kcal = Kilocalories, HOMA-IR= homeostatic model assessment of insulin resistance; Fasting serum glucose at Year 0 (baseline) for n=1,213 women, and Year 7 before DM onset for n=10 women (all values < 100 mg/dL), and missing for n=5 women.

Table 2: Characteristics by Lactation Duration Categories (n =1,238 parous women) during the 30-Year Follow Up (1986 to 2016).

Follow-up (Up to Year 30) Characteristics		Lactation Duration Categories None (n=322)	>0 to 6 months (n=418)	>6 to<12 months (n=268)	≥12 months (n=230)	p-value
				n (%)		
Education (high school or less)		86 (26.7)	49 (11.7)	16 (6.0)	9 (3.9)	<.001
Post-menopausal		166 (51.6)	230 (55.0)	161 (60.1)	127 (55.2)	0.23
Perinatal Outcomes						
Births Post-baseline:	1 birth	171 (53.1)	227 (54.3)	99 (36.9)	12 (5.2)	<.001
	2 births	94 (29.2)	144 (34.4)	127 (47.4)	125 (54.3)	<.001
	3 or more	57 (17.7)	47 (11.2)	42 (15.7)	93 (40.4)	<.001
Gestational hypertensive disorders		82 (25.5)	104 (24.9)	63 (23.5)	57 (24.8)	0.96
History of GDM (ever)		43 (13.4)	43 (10.3)	34 (12.7)	35 (15.2)	0.30
Preterm birth (< 37 weeks)		70 (21.8)	77 (18.6)	41 (15.5)	38 (16.6)	0.22
Cesarean section		106 (32.9)	122 (29.2)	78 (29.1)	62 (27.0)	0.47
Medical conditions/ medication use						
Anti-hypertensive medications		123 (38.2)	119 (28.5)	42 (15.7)	45 (19.6)	<.001
Lipid lowering medications		68 (21.1)	64 (15.3)	33 (12.3)	24 (10.4)	0.002
Incident metabolic syndrome		69 (21.4)	58 (13.9)	20 (7.5)	14 (6.1)	<.001
Family history of diabetes		172 (53.4)	188 (45.0)	119 (44.4)	83 (36.1)	<.001
				Mean (SD)		
Age (years)		48.2 (7.9)	51.0 (7.2)	51.7 (7.0)	52.0 (6.5)	<.001
BMI, kg/m^2		32.9 (8.6)	30.8 (8.2)	29.2 (7.2)	28.0 (7.1)	<.001
Weight change, kg		20.7 (17.1)	19.6 (16.3)	15.8 (15.6)	15.5 (15.6)	<.001
Smoking (pack-years)		6.2 (9.6)	3.8 (7.2)	3.1 (7.9)	2.1 (5.6)	<.001
Dietary Quality Score		58.9 (9.6)	67.6 (10.9)	71.7 (10.9)	72.1 (10.2)	<.001
				Median (IQR)		
Weight change (kg) †		20.7 (17.1)	19.6 (16.3)	15.8 (15.6)	15.5 (15.6)	<.001
Physical activity change †		- 72.5 (304.0)	- 48.0 (328.0)	- 57.0 (336.0)	- 83.0 (281.0)	0.46
Lactation duration, all births (months)†		0.0 (0.0)	2.9 (3.1)	7.9 (1.0)	15.8 (5.4)	<.001

† Kruskal-Wallis test; ‡ *A Priori* Dietary Quality score average of exam Years 0, 7 and 20.

Supplemental Table 3: Unadjusted and Adjusted Relative Hazards (95%CI) of Incident Type 2 Diabetes during 30 Years of Follow up Among Lactation Duration Categories on Women Nulliparous at Baseline (n=848 total nulliparous women)

	Time Dependent Lactation Duration Categories				
Models	None (n = 157)	> 0 to 6 months (n = 296)	> 6 to 12 months (n = 202)	>12 months (n = 193)	p-value trend
Model 1 Unadjusted	1.00 referent	0.50 (0.32, 0.78)	0.36 (0.21, 0.62)	0.26 (0.14, 0.49)	< 0.001
Model 2 = **M1** + Adjusted for race time-dependent parity and GDM status during follow up	1.00 referent	0.65 (0.41, 1.03)	0.54 (0.30, 0.95)	0.38 (0.19, 0.76)	0.008
Model 3 = **M2** + age, baseline covariates: BMI, waist circumference, and fasting glucose and familiy history of diabetes	1.00 referent	0.83 (0.51, 1.34)	0.61 (0.34, 1.10)	0.46 (0.23, 0.95)	0.022
Model 4 = **M3** + time-dependent physical activity score and diet quality behaviors	1.00 referent	0.71 (0.42, 1.20)	0.52 (0.28, 0.98)	0.44 (0.21, 0.94)	0.019
Model 5 = **M4** + time-dependent weight change during follow-up	1.00 referent	0.66 (0.39, 1.10)	0.50 (0.27, 0.94)	0.44 (0.21, 0.93)	0.023

There is no evidence of effect modification by race, GDM status, or parity groups. All p-values >0.16
n=2 women are missing fasting serum glucose at baseline and year 7,
n= 1 woman is missing follow up physical activity score, and n= 7 women are missing average diet quality score.

Supplemental Table 4: Unadjusted and Adjusted Relative Hazards (95%CI) of Incident Diabetes in Women per month of Lactation during 30-Year Follow up for All Women, and Stratified by Black Women and White Women. (Interaction p-value = 0.137)

Model Covariates	**ALL women N=1,238** RH per month of lactation, (95%CI)	p-trend	**Black Race N=615** RH per month of lactation, (95%CI)	p-trend	**White Race N=623** RH per month of lactation, (95%CI)	p-trend
Model 1 Unadjusted	0.928 (0.900-0.956)	<.0001	0.974 (0.937-1.01)	0.170	0.935 (0.889-0.983)	0.009
Model 2 = **M1** + Adjusted for race**,** time-dependent parity and GDM status during follow up	0.954 (0.925-0.984)	0.003	0.972 (0.934-1.01)	0.146	0.927 (0.880-0.976)	0.004
Model 3 = **M2** + Age, baseline covariates: (BMI, waist circumference and fasting glucose) and family history of diabetes	0.957 (0.927-0.988)	0.007	0.972 (0.933-1.01)	0.171	0.954 (0.905-1.00)	0.074
Model 4 = **M3** + time-dependent physical activity scores and diet quality score (behaviors)	0.959 (0.927-0.992)	0.015	0.970 (0.928-1.01)	0.183	0.956 (0.905-1.01)	0.102
Model 5 = **M4** + time-dependent weight change during follow-up	0.961 (0.929-0.993)	0.017	0.970 (0.927-1.01)	0.182	0.957 (0.908-1.01)	0.100

Covariates: Time-dependent weight gain = weight gain above the median versus at or below from baseline through end of follow-up. Time-dependent physical activity score for race-specific quartiles; *A Priori* Diet Quality score evaluated as the average of the baseline and follow up exam scores; Years 0, 7 and 20.