Online-Only Supplemental Material

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Footnote: Mean follow-up time: 12.2 years for GDM and 13.4 years for non-GDM. Top and bottom dotted line indicates values of the population 25th and the 75th percentiles, respectively.

Supplementary Table 1. Characterization of 4-year change category for each lifestyle factor

	4-year change	
Lifestyle factor	Baseline cycle	Following cycle
Diet quality (AHEI)*		
Stay low	Tertile 1	Tertile 1
Low to medium	Tertile 1	Tertile 2
Low to high	Tertile 1	Tertile 3
Stay medium	Tertile 2	Tertile 2
Medium to low	Tertile 2	Tertile 1
Medium to high	Tertile 2	Tertile 3
Stay high	Tertile 3	Tertile 3
High to medium	Tertile 3	Tertile 2
High to low	Tertile 3	Tertile 1
Physical activity (MET-hr/week)†		
Stay low	<7.5	<7.5
Increase	<7.5	≥7.5
Stay high	≥7.5	≥7.5
Decrease	≥7.5	<7.5
Alcohol consumption (serving/d)		
Non-drinker	Zero	Zero
Recent starter	Zero	Non-zero
Recent quitter	Non-zero	Zero
Stable drinker	Non-zero remained constant	
Drinker with increasing consumption	Non-zero	Greater than baseline
Drinker with decreasing consumption	Non-zero	Lower than baseline
Smoking status		
Never smoker	Never	Never
Recent starter	Never	Current
Past smoker	Past	Past
Re-starter	Past	Current
Recent quitter	Current	Past
Continued smoker	Current	Current

Abbreviations: AHEI, Alternate Healthy Eating Index.
* Median was 42.9, 55.3, and 69.5 for AHEI tertile 1, tertile 2, and tertile 3 group, respectively.
† 7.5 MET-hr/week is equivalent to 150 min/week of moderate-intensity physical activity.

Supplementary Table 2. Associations between 4-year change in lifestyle in mid-life and weight change, stratified by history of GDM

Change in lifestyle	LS means of 4-year weight change (kg), 95% CI*			
	No history of GDM (n=51,174, 94.7%)		History of GDM (n=2,888, 5.3%)	
	Mean follow-up: 13.4 yrs		Mean follow-up: 12.2 yrs	
	n*	Weight change, mean (SD): 1.33 (6.31)	n	Weight change, mean (SD): 1.10 (7.55)
Change in AHEI				
Low to high	3,921	-1.19 (-1.41, -0.96)	213	-2.97 (-4.34, -1.60)
Low to medium	14,626	0.55 (0.45, 0.66)	806	-0.43 (-1.00, 0.14)
Medium to high	14,702	0.21 (0.12, 0.31)	731	-0.07 (-0.57, 0.42)
Stay high	36,629	1.02 (0.98, 1.07)	1,726	0.68 (0.44, 0.93)
Stay medium	25,156	1.41 (1.35, 1.48)	1,232	1.04 (0.68, 1.39)
Stay low	35,079	1.73 (1.68, 1.79)	1,978	1.78 (1.51, 2.05)
Medium to low	14,619	2.34 (2.24, 2.44)	865	2.49 (2.00, 2.99)
High to medium	14,655	2.13 (2.04, 2.23)	729	2.17 (1.70, 2.63)
High to low	3,335	3.41 (3.16, 3.66)	157	4.01 (2.78, 5.23)
p-value†		<0.001		<0.001
Overall *p*-heterogeneity‡				0.04
Change in physical activity				
Increase	13,705	0.90 (0.80, 1.01)	788	0.26 (-0.25, 0.77)
Stay high	105,022	1.14 (1.11, 1.17)	5,009	0.99 (0.83, 1.15)
Stay low	31,555	1.79 (1.73, 1.86)	1,967	1.28 (0.96, 1.60)
Decrease	12,440	2.31 (2.20, 2.42)	673	2.49 (1.93, 3.04)
p-value		<0.001		<0.001
Overall *p*-heterogeneity				0.02
Status of alcohol drinking§				
Non-drinker	45,214	1.40 (1.35, 1.45)	2,830	1.23 (1.01, 1.46)

Recent starter	12,980	1.38 (1.27, 1.49)	721	0.70 (0.15, 1.26)
Recent quitter	9,485	1.28 (1.13, 1.42)	538	0.84 (0.12, 1.56)
Stable drinker	40,045	1.32 (1.25, 1.40)	1,734	0.98 (0.62, 1.34)
Drinker with increasing consumption	32,314	1.32 (1.27, 1.37)	1,503	1.24 (0.94, 1.53)
Drinker with decreasing consumption	16,241	1.31 (1.25, 1.37)	780	0.93 (0.61, 1.25)
p-value		0.16		0.31
Overall *p*-heterogeneity				0.32
Change in smoking status				
Never smoker	107,878	1.31 (1.28, 1.33)	5,673	1.11 (0.96, 1.25)
Recent starter	263	0.96 (0.10, 1.83)	14	0.27 (-3.04, 3.58)
Past smoker	41,576	1.34 (1.30, 1.39)	2,157	0.90 (0.64, 1.16)
Re-starter	1,333	-0.21 (-0.56, 0.14)	60	0.94 (-1.88, 3.77)
Recent quitter	3,035	3.85 (3.60, 4.11)	151	4.38 (3.15, 5.60)
Continued smoker	8,637	1.04 (0.93, 1.14)	382	1.03 (0.38, 1.67)
p-value		<0.001		<0.001
Overall *p*-heterogeneity				0.34

Abbreviations: AHEI, Alternate Healthy Eating Index; BMI, body mass index; CI, confidence interval; GDM, gestational diabetes mellitus; HRT, hormonal replacement therapy; LS, least squares.

* LS means of weight change were modeled in the multivariable marginal models with generalized estimating equations adjusting for follow-up period, race (white, non-white), marital status (ever married, others), family history of diabetes (yes, no), age (years), BMI (underweight <18.5 kg/m^2, normal 18.5-24.9 kg/m^2, overweight 25-29.9 kg/m^2, obese ≥30.0 kg/m^2), oral contraceptive use (current, past, never), menopausal and HRT use status (premenopausal never HRT use, postmenopausal never HRT use, postmenopausal current HRT use, postmenopausal past HRT use, missing), sleep duration (≤6 hours, 7-8 hours, >8 hours), and concurrent changes in the other lifestyle factors (continuous change in AHEI score including alcohol, continuous change in physical activities in MET-hr/week, categorical change in smoking status) depending on the model. There was a total of 8,437 and 162,722 4-year observations from GDM and non-GDM women, respectively, during follow-up period. Number of observations for each change category was presented within status of GDM history.

† P-value from the generalized score statistics for the lifestyle of interest in the stratified analysis by history of GDM was presented.

‡ P-value from the generalized score statistics for the interaction term between the lifestyle and history of GDM was presented.

§ AHEI without component of alcohol was adjusted in the models for change in alcohol consumption.

Supplementary Table 3. Joint associations of 4-year change in diet and physical activity with weight change, stratified by history of GDM

				LS means of 4-year weight change (kg), 95% CI*				
				No history of GDM (n=51,174)				
Change in AHEI	n†	PA increase	n	PA stay high	n	PA stay low	n	PA decrease
Low to high	403	-2.90 (-3.73, -2.07)	2,536	-0.99 (-1.25, -0.73)	717	-1.35 (-1.97, -0.74)	265	-0.37 (-1.23, 0.48)
Low to medium	1,473	0.01 (-0.35, 0.36)	8,548	0.56 (0.44, 0.68)	3,429	0.47 (0.22, 0.72)	1,176	1.48 (1.13, 1.83)
Medium to high	1,175	-0.96 (-1.35, -0.57)	10,634	0.17 (0.06, 0.27)	1,963	0.51 (0.20, 0.81)	930	1.19 (0.79, 1.59)
Stay high	2,033	0.61 (0.35, 0.86)	29,504	0.88 (0.83, 0.93)	3,052	1.54 (1.33, 1.75)	2,040	2.34 (2.08, 2.60)
Stay medium	2,191	0.74 (0.46, 1.01)	16,369	1.24 (1.17, 1.32)	4,562	1.83 (1.65, 2.00)	2,034	2.58 (2.29, 2.87)
Stay low	3,725	1.32 (1.12, 1.51)	16,863	1.47 (1.39, 1.54)	11,300	2.12 (2.01, 2.23)	3,191	2.46 (2.24, 2.68)
Medium to low	1,370	2.28 (1.96, 2.61)	8,241	2.01 (1.88, 2.13)	3,660	2.82 (2.59, 3.05)	1,348	3.38 (3.04, 3.73)
High to medium	1,050	2.20 (1.83, 2.57)	10,343	1.93 (1.83, 2.04)	2,140	2.82 (2.52, 3.13)	1,122	2.73 (2.35, 3.11)
High to low	285	3.07 (2.33, 3.82)	1,984	3.00 (2.71, 3.28)	732	4.47 (3.84, 5.10)	334	4.16 (3.22, 5.09)
				History of GDM (n=2,888)				
Change in AHEI	n	PA increase	n	PA stay high	n	PA stay low	n	PA decrease
Low to high	27	-5.59 (-8.60, -2.58)	129	-3.16 (-4.99, -1.33)	49	-1.71 (-4.63, 1.22)	8	-0.40 (-4.35, 3.55)
Low to medium	82	-0.96 (-2.55, 0.63)	444	-0.41 (-1.12, 0.29)	216	-0.55 (-1.75, 0.66)	64	0.33 (-2.44, 3.10)
Medium to high	56	-0.58 (-2.55, 1.39)	496	0.14 (-0.37, 0.65)	120	-1.48 (-3.15, 0.19)	59	1.22 (-0.69, 3.14)
Stay high	118	0.12 (-1.14, 1.37)	1,309	0.48 (0.21, 0.76)	193	1.21 (0.27, 2.15)	106	2.58 (1.50, 3.65)
Stay medium	130	1.50 (0.56, 2.43)	745	0.95 (0.54, 1.35)	254	0.42 (-0.61, 1.44)	103	2.52 (1.04, 4.00)
Stay low	200	0.05 (-1.10, 1.20)	890	1.82 (1.42, 2.21)	724	2.19 (1.69, 2.68)	164	2.18 (1.15, 3.20)
Medium to low	95	2.00 (0.48, 3.52)	428	2.37 (1.75, 2.98)	251	1.97 (0.83, 3.11)	91	5.27 (4.10, 6.44)
High to medium	65	0.49 (-1.23, 2.22)	485	1.84 (1.31, 2.37)	121	3.45 (2.24, 4.67)	58	4.26 (2.45, 6.06)
High to low	15	0.40 (-2.83, 3.63)	83	4.50 (2.85, 6.14)	39	4.74 (2.40, 7.08)	20	3.83 (-0.20, 7.85)
Overall p-heterogeneity by GDM‡								0.28

Abbreviations: AHEI, Alternate Healthy Eating Index; BMI, body mass index; CI, confidence interval; GDM, gestational diabetes mellitus; HRT, hormonal replacement therapy; LS, least squares; PA, physical activity.

* LS means of weight change were modeled in the multivariable marginal models with generalized estimating equations adjusting for follow-up period, race (white, non-white), marital status (ever married, others), family history of diabetes (yes, no), age (years), BMI (underweight <18.5 kg/m^2, normal 18.5-24.9 kg/m^2, overweight 25-29.9 kg/m^2, obese ≥30.0 kg/m^2), oral contraceptive use (current, past, never), menopausal and HRT use status (premenopausal never HRT use, postmenopausal never HRT use, postmenopausal current HRT use, postmenopausal past HRT use, missing), sleep duration (≤6 hours, 7-8 hours, >8 hours), and categorical change in smoking status.

† There was a total of 8,437 and 162,722 4-year observations from GDM and non-GDM women, respectively, during follow-up period. Number of observations for each joint change category was presented within status of GDM history.

‡ P-value from the generalized score statistics for the interaction term between categorical joint variables of AHEI and PA and history of GDM status was presented.

Supplementary Table 4. Associations between 4-year change in lifestyle in mid-life and weight change restricting to women with baseline BMI ≥25 kg/m², stratified by history of GDM

		LS means of 4-year weight change (kg), 95% CI*		
		No history of GDM (n=30,180)		**History of GDM (n=2,067)**
BMI (kg/m²), mean (SD)		30.63 (5.19)		31.94 (5.93)
Mean weight change (kg), mean (SD)		0.90 (7.90)		0.62 (8.87)
Change in lifestyle	**n†**		**n**	
Change in AHEI				
Low to high	2,090	-3.01 (-3.41, -2.61)	141	-4.73 (-6.69, -2.76)
Low to medium	7,919	-0.25 (-0.43, -0.08)	550	-1.28 (-2.04, -0.52)
Medium to high	6,781	-0.90 (-1.08, -0.71)	426	-0.81 (-1.59, -0.04)
Stay high	13,899	0.46 (0.35, 0.57)	825	-0.19 (-0.67, 0.29)
Stay medium	12,609	1.06 (0.94, 1.18)	814	0.60 (0.09, 1.11)
Stay low	20,105	1.64 (1.55, 1.73)	1,385	1.64 (1.26, 2.02)
Medium to low	8,032	2.38 (2.21, 2.54)	597	2.30 (1.63, 2.96)
High to medium	6,855	2.14 (1.96, 2.32)	420	2.23 (1.49, 2.96)
High to low	1,791	3.55 (3.17, 3.93)	107	3.81 (2.16, 5.45)
Change in physical activity				
Increase	7,499	0.39 (0.21, 0.56)	529	-0.50 (-1.22, 0.22)
Stay high	45,177	0.60 (0.54, 0.67)	2,769	0.36 (0.08, 0.64)
Stay low	19,963	1.62 (1.52, 1.71)	1,470	1.21 (0.81, 1.61)
Decrease	7,442	2.16 (1.99, 2.33)	497	2.21 (1.50, 2.93)
Status of alcohol drinking‡				
Non-drinker	25,460	1.12 (1.04, 1.21)	1,960	1.00 (0.67, 1.34)
Recent starter	6,994	0.93 (0.74, 1.12)	493	-0.17 (-0.90, 0.56)
Recent quitter	5,383	0.75 (0.53, 0.98)	378	0.48 (-0.50, 1.45)
Stable drinker	16,864	1.07 (0.93, 1.22)	914	0.58 (0.03, 1.14)
Drinker with increasing consumption	14,610	0.87 (0.77, 0.97)	856	0.75 (0.25, 1.25)

Drinker with decreasing consumption	7,542	0.97 (0.86, 1.08)	470	0.36 (-0.16 to 0.87)
Change in smoking status				
Never smoker	52,148	0.96 (0.91, 1.01)	3,462	0.67 (0.44, 0.91)
Recent starter	127	0.34 (-1.11, 1.80)	12	-0.37 (-4.22, 3.49)
Past smoker	21,321	1.04 (0.95, 1.12)	1,394	0.52 (0.12, 0.92)
Re-starter	744	-1.10 (-1.65, -0.54)	42	-0.34 (-3.90, 3.22)
Recent quitter	1,536	3.61 (3.18, 4.04)	109	4.21 (2.68, 5.73)
Continued smoker	4,205	0.39 (0.19, 0.58)	246	0.44 (-0.45, 1.33)

Abbreviations: AHEI, Alternate Healthy Eating Index; BMI, body mass index; CI, confidence interval; GDM, gestational diabetes mellitus; HRT, hormonal replacement therapy; LS, least squares.

* LS means of weight change were modeled in the multivariable marginal models with generalized estimating equations adjusting for follow-up period, race (white, non-white), marital status (ever married, others), family history of diabetes (yes, no), baseline age (years), BMI (kg/m^2), oral contraceptive use (current, past, never), menopausal and HRT use status (premenopausal never HRT use, postmenopausal never HRT use, postmenopausal current HRT use, postmenopausal past HRT use, missing), sleep duration (≤6 hours, 7-8 hours, >8 hours), and concurrent changes in other lifestyles.

† There was a total of 5,265 and 80,081 4-year observations from GDM and non-GDM women with BMI ≥25 kg/m^2, respectively, during follow-up period. Number of observations for each change category was presented within status of GDM history.

‡ AHEI without component of alcohol was adjusted in the models for change in alcohol consumption.
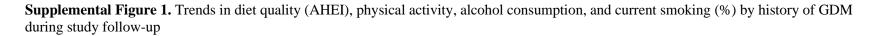
Supplementary Table 5. Joint associations of 4-year change in diet and physical activity with weight change restricting to women with baseline BMI ≥25 kg/m^2, stratified by history of GDM (other results not shown)
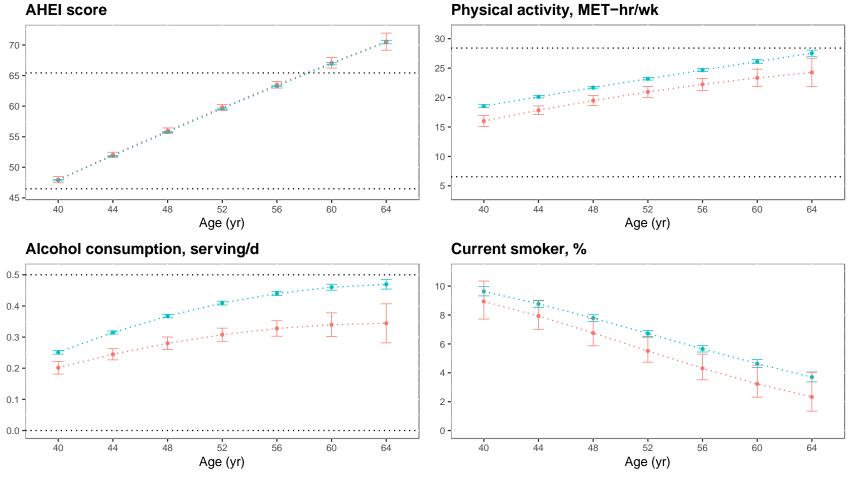
		LS means of 4-year weight change (kg), 95% CI*			
Joint AHEI and PA		**No history of GDM (n=30,180)**		**History of GDM (n=2,067)**	
AHEI	PA	n†		n	
Low to high	Increase	225	-5.09 (-6.49, -3.70)	21	-6.92 (-10.85, -2.99)
Low to high	Stay high	1,238	-2.90 (-3.40, -2.41)	76	-5.65 (-8.55, 2.75)
High to low	Stay low	455	4.63 (3.78, 5.48)	29	4.86 (1.96, 7.76)
High to low	Decrease	199	4.50 (3.19, 5.82)	15	3.54 (-1.29, 8.38)

Abbreviations: AHEI, Alternate Healthy Eating Index; BMI, body mass index; GDM, gestational diabetes mellitus; HRT, hormonal replacement therapy; LS, least squares; PA, physical activity.

* LS means of weight change were modeled in the multivariable marginal models with generalized estimating equations adjusting for follow-up period, race (white, non-white), marital status (ever married, others), family history of diabetes (yes, no), baseline age (years), BMI (kg/m^2), oral contraceptive use (current, past, never), menopausal and HRT use status (premenopausal never HRT use, postmenopausal never HRT use, postmenopausal current HRT use, postmenopausal past HRT use, missing), sleep duration (≤6 hours, 7-8 hours, >8 hours), and categorical change in smoking status.

† There was a total of 5,265 and 80,081 4-year observations from GDM and non-GDM women with BMI ≥25 kg/m^2, respectively, during follow-up period. Number of observations for each joint change category was presented within status of GDM history.

Supplemental Figure 1. Trends in diet quality (AHEI), physical activity, alcohol consumption, and current smoking (%) by history of GDM during study follow-up