

Table S1 Descriptive statistics for cardiometabolic biomarkers during mid-childhood (baseline) and the early teens (follow-up) in 447 boys and 444 girls in Project Viva

	Boys (n = 447)		P-value ^a	Girls (n = 444)		P-value ^a
	Baseline	Follow-up		Baseline	Follow-up	
Child characteristics						
Age (years)	7.9 ± 0.8	13.1 ± 0.9	<0.0001	7.9 ± 0.9	13.1 ± 0.8	<0.0001
Race/ethnicity, % (N)						
White	62.4% (279)	--		67.0% (297)	--	
Black	17.2% (77)	--		14.9% (66)	--	
Hispanic	5.2% (23)	--		3.8% (17)	--	
Other	15.2% (68)	--		14.2% (63)	--	
BMI z-score	0.42 ± 0.96	0.39 ± 1.06	0.21	0.38 ± 1.03	0.34 ± 1.06	0.15
Waist circumference (cm)	59.7 ± 7.8	73.0 ± 12.1	<0.0001	60.1 ± 8.6	72.5 ± 11.1	<0.0001
Overweight/obese, % (N)	25.1% (111)	26.7% (119)	<0.0001	25.7% (114)	27.0% (120)	<0.0001
Pubertal, % (N)	16.4% (71)	80.6% (358)	0.001	26.8% (116)	98.0% (434)	0.07
Metabolic biomarkers						
Glucose (mg/dL)	96.2 ± 15.9	93.3 ± 18.5	0.07	94.6 ± 14.9	90.9 ± 11.8	0.005
Insulin (μU/mL)	7.1 ± 6.6	15.7 ± 21.2	<0.0001	8.9 ± 6.4	16.9 ± 14.6	<0.0001
HOMA-IR	1.77 ± 2.00	3.15 ± 4.73	<0.0001	2.11 ± 1.69	3.5 ± 2.4	<0.0001
Leptin (ng/mL)	5.0 ± 6.4	8.2 ± 10.8	<0.0001	7.0 ± 8.1	15.7 ± 15.8	<0.0001
Adiponectin (ng/mL)	15.1 ± 6.4	6.0 ± 2.7	<0.0001	15.4 ± 8.3	6.8 ± 2.8	<0.0001
Total cholesterol (mg/dL)	160.1 ± 29.5	155.3 ± 30.4	0.003	160.3 ± 24.9	157.1 ± 25.3	0.01
HDL (mg/dL)	58.4 ± 13.4	55.7 ± 14.0	0.009	55.5 ± 13.9	55.7 ± 12.6	0.55
LDL (mg/dL)	90.4 ± 25.8	86.0 ± 25.7	0.0002	93.0 ± 12.6	87.2 ± 21.8	<0.0001
Triglycerides (mg/dL)	56.4 ± 23.5	67.7 ± 31.3	<0.0001	59.0 ± 23.6	71.2 ± 29.6	<0.0001
CRP (mg/L)	0.8 ± 2.4	0.8 ± 1.5	0.51	1.2 ± 3.6	0.9 ± 2.2	0.15
IL-6 (pg/mL)	1.0 ± 1.5	1.2 ± 1.4	0.08	1.0 ± 1.2	1.5 ± 3.6	0.08
SBP (mmHg)	95 ± 8	109 ± 9	<0.0001	95 ± 9	105 ± 9	<0.0001

HOMA-IR: homeostatic model insulin resistance; **HDL:** high-density lipoprotein; **LDL:** low-density lipoprotein; **CRP:** C-reactive protein; **IL-6:** interleukin-6; **SBP:** systolic blood pressure

a From a paired sample t-test for continuous variables; from a Pearson Chi-squared test for % overweight/obese and % pubertal.

Table S2 Spearman correlations among metabolic biomarkers at baseline, at follow-up, and change between baseline and follow-up.

	<i>N</i>	Glucose	Insulin	HOMA	Leptin	Adip.	TC	HDL	LDL	TRG	CRP	IL-6	SBP
Baseline (~7 years of age)													
Glucose (mg/dL)	482	1.00											
Insulin (μU/mL)	502	0.15	1.00										
HOMA-IR	464	0.35	0.97	1.00									
Leptin (ng/mL)	514	0.00	0.34	0.32	1.00								
Adiponectin (ng/mL)	514	-0.09	-0.09	-0.10	-0.05	1.00							
Total cholesterol (mg/dL)	525	-0.07	0.04	0.06	0.06	0.13	1.00						
HDL (mg/dL)	525	-0.05	0.07	-0.05	-0.11	0.21	0.42	1.00					
LDL (mg/dL)	525	-0.08	0.03	0.04	0.10	0.02	0.86	-0.01	1.00				
Triglycerides (mg/dL)	525	0.11	0.23	0.25	0.12	-0.05	0.17	-0.34	0.23	1.00			
CRP (mg/L)	532	0.02	0.18	0.19	0.27	-0.11	-0.05	-0.24	0.07	0.04	1.00		
IL-6 (pg/mL)	514	-0.02	0.05	0.05	0.05	-0.08	-0.04	-0.19	0.07	0.01	0.45	1.00	
SBP (mmHg)	889	0.02	0.23	0.23	0.22	-0.11	0.05	-0.05	0.07	0.04	0.14	0.07	1.00
Follow-up (~12 years of age)													
Glucose (mg/dL)	564	1.00											
Insulin (μU/mL)	607	0.19	1.00										
HOMA-IR	544	0.36	0.98	1.00									
Leptin (ng/mL)	607	0.11	0.56	0.63	1.00								
Adiponectin (ng/mL)	607	0.04	-0.17	-0.15	-0.10	1.00							
Total cholesterol (mg/dL)	607	-0.06	-0.05	-0.06	0.13	0.10	1.00						
HDL (mg/dL)	607	-0.04	-0.28	-0.28	-0.23	0.30	0.35	1.00					
LDL (mg/dL)	607	-0.03	0.02	0.03	0.23	-0.02	0.87	-0.04	1.00				
Triglycerides (mg/dL)	607	-0.08	0.29	0.24	0.29	-0.09	0.23	-0.41	0.25	1.00			
CRP (mg/L)	590	0.05	0.19	0.21	0.43	-0.19	-0.01	-0.32	0.12	0.17	1.00		
IL-6 (pg/mL)	604	0.02	0.12	0.13	0.25	-0.14	-0.02	-0.20	0.06	0.09	0.51	1.00	
SBP (mmHg)	888	0.10	0.16	0.16	0.00	-0.08	-0.08	-0.11	-0.05	0.01	0.07	0.06	1.00
Change (follow-up minus baseline)													
Glucose (mg/dL)	357	1.00											
Insulin (μU/mL)	401	0.13	1.00										
HOMA-IR	336	0.33	0.96	1.00									
Leptin (ng/mL)	395	0.14	0.37	0.44	1.00								
Adiponectin (ng/mL)	395	-0.11	-0.04	-0.07	-0.07	1.00							
Total cholesterol (mg/dL)	416	0.01	0.00	-0.09	0.11	0.09	1.00						
HDL (mg/dL)	416	-0.01	-0.17	-0.13	-0.12	0.25	0.52	1.00					
LDL (mg/dL)	416	-0.02	-0.09	-0.10	0.16	0.00	0.88	0.16	1.00				
Triglycerides (mg/dL)	416	0.01	0.26	0.20	0.22	-0.03	0.26	-0.25	0.22	1.00			
CRP (mg/L)	400	-0.06	0.02	-0.02	0.02	-0.10	-0.04	-0.28	0.11	0.01	1.00		
IL-6 (pg/mL)	394	-0.12	-0.11	-0.14	0.00	-0.15	-0.11	-0.19	-0.05	0.02	0.49	1.00	
SBP (mmHg)	887	-0.05	0.07	0.05	-0.05	-0.15	-0.09	-0.07	-0.08	0.08	0.11	0.01	1.00

Abbreviations: HOMA-IR: homeostatic model insulin resistance; HDL: high-density lipoprotein; LDL: low-density lipoprotein; CRP: C-reactive protein; IL-6: interleukin-6; SBP: systolic blood pressure

Table S3 Adjusted estimates for change in each biomarker during follow-up with respect to **adrenal pubertal status^a** at baseline among Project Viva participants.

	Mean $\pm$ SE ^b		β (95% CI) ^b
	Pre-pubertal <i>n</i> = 726	Pubertal <i>n</i> = 133	Pubertal vs. pre-pubertal
Δ Glucose (mg/dL)	-4.82 $\pm$ 3.21	-8.17 $\pm$ 3.94	-3.35 (-8.51, 1.80)
Δ Insulin (μ U/mL)	9.24 $\pm$ 3.40	6.87 $\pm$ 4.17	-2.37 (-7.80, 3.07)
Δ HOMA-IR	1.84 $\pm$ 0.81	1.54 $\pm$ 1.01	-0.30 (-1.67, 1.06)
Δ Leptin (ng/mL)	6.19 $\pm$ 2.02	6.66 $\pm$ 2.46	0.46 (-2.77, 3.71)
Δ Adiponectin (ng/mL)	-9.73 $\pm$ 0.43	-9.50 $\pm$ 0.53	0.23 (-0.46, 0.92)
Δ Total cholesterol (mg/dL)	-0.57 $\pm$ 4.19	-8.57 $\pm$ 5.08	-8.00 (-14.53, -1.46)
Δ HDL (mg/dL)	-0.97 $\pm$ 1.93	-2.69 $\pm$ 2.33	-1.72 (-4.74, 1.29)
Δ LDL (mg/dL)	-2.36 $\pm$ 3.36	-8.35 $\pm$ 4.08	-6.00 (-11.26, -0.73)
Δ Triglycerides (mg/dL)	10.61 $\pm$ 5.03	7.95 $\pm$ 6.09	-2.66 (-10.55, 5.23)
Δ CRP (mg/L)	-0.18 $\pm$ 0.33	-0.50 $\pm$ 0.40	-0.32 (-0.84, 0.20)
Δ IL-6 (pg/mL)	0.51 $\pm$ 0.57	0.05 $\pm$ 0.69	-0.47 (-1.37, 0.44)
Δ SBP (mmHg)	11.97 $\pm$ 1.06	12.67 $\pm$ 1.22	0.70 (-0.89, 2.29)

HOMA-IR: homeostatic model insulin resistance; **HDL:** high-density lipoprotein; **LDL:** low-density lipoprotein; **CRP:** C-reactive protein; **IL-6:** interleukin-6; **SBP:** systolic blood pressure

a Based on development of body hair for girls, and of body hair and facial hair for boys.

b Estimates are adjusted for sex, age at baseline and follow-up, baseline biomarker level, baseline weight status, and race/ethnicity. Bolded font indicates statistical significance at $P < 0.05$.

Table S4 Adjusted estimates for change in each biomarker during follow-up with respect to **gonadal puberty** at baseline among girls.^a

	β (95% CI) in Δmetabolic biomarkers with respect to breast development		
	Mean ± SE^b		β (95% CI)^b Yes vs. no
	No n = 346	Yes n = 77	
ΔGlucose (mg/dL)	-3.95 ± 1.64	-5.24 ± 2.54	-1.30 (-6.54, 3.95)
ΔInsulin (μU/mL)	8.98 ± 1.89	3.51 ± 2.84	-5.47 (-11.40, 0.47)
ΔHOMA-IR	1.80 ± 0.35	0.66 ± 0.55	-1.14 (-2.26, -0.03)
ΔLeptin (ng/mL)	10.31 ± 1.86	7.82 ± 2.74	-2.49 (-8.33, 3.36)
ΔAdiponectin (ng/mL)	-9.19 ± 0.34	-9.50 ± 0.50	-0.31 (-1.37, 0.75)
ΔTotal cholesterol (mg/dL)	-9.44 ± 3.10	-13.39 ± 4.50	-3.95 (-13.52, 5.63)
ΔHDL (mg/dL)	-1.72 ± 1.43	-2.40 ± 2.07	-0.68 (-5.09, 3.74)
ΔLDL (mg/dL)	-8.98 ± 2.48	-12.61 ± 3.61	-3.62 (-11.28, 4.03)
ΔTriglycerides (mg/dL)	5.26 ± 3.87	9.15 ± 5.68	3.90 (-8.14, 15.94)
ΔCRP (mg/L)	-0.36 ± 0.30	-0.76 ± 0.44	-0.40 (-1.36, 0.56)
ΔIL-6 (pg/mL)	1.02 ± 0.64	-0.18 ± 0.93	-1.19 (-3.17, 0.78)
ΔSBP (mmHg)	10.62 ± 0.80	11.54 ± 1.21	0.92 (-1.66, 3.50)

HOMA-IR: homeostatic model insulin resistance; **HDL:** high-density lipoprotein; **LDL:** low-density lipoprotein; **CRP:** C-reactive protein; **IL-6:** interleukin-6; **SBP:** systolic blood pressure

a Based on breast development.

b Estimates are adjusted for sex, age at baseline and follow-up, baseline biomarker level, baseline weight status, and race/ethnicity. Bolded estimates indicate statistical significance at $P < 0.05$.