

Supplementary materials

Body composition, body mass and cardiovascular health in mid-childhood and midlife: A compositional data analysis

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Supplementary File 1

Procedures

From December 2014, we contacted interested CheckPoint families and booked a single appointment for parent-child dyads. Most (n=1356, 72%) families attended a 3.5-hour appointment comprising multiple 15-minute measurement stations at CheckPoint's main assessment centres, located in the seven largest cities around Australia. A small number of families (n = 518) who attended mini-assessment centres in smaller regional cities (2.5-hour appointment) or received a home visit (1.5 hours) had fewer measurements due to limitations in equipment transportability. These families had body composition measured but not cIMT or retinal vascular calibre.

Ethics

The CheckPoint study was approved by The Royal Children's Hospital Melbourne Human Research Ethics Committee (33225D) and The Australian Institute of Family Studies Ethics Committee (14-26). The attending parents/caregivers provided written informed consent for themselves and their children to participate in the study.

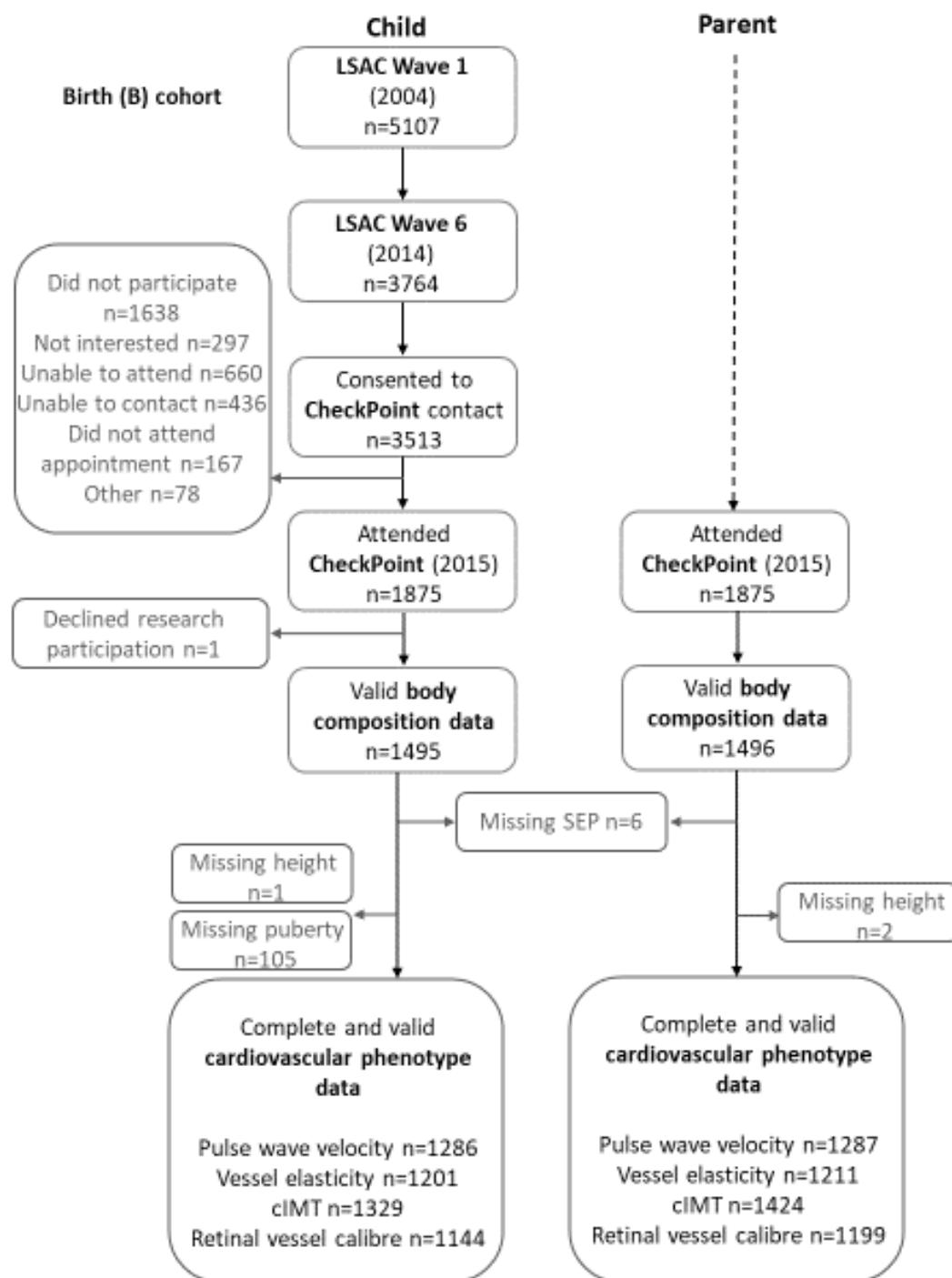
Supplementary File 2

Aim 1: Compositional linear regression models were used to explore the associations between body composition (expressed as a set of two isometric log ratios) and the CV measures, expressed as sample-specific z-scores. We also predicted CV measures for FFM proportions ranging from 90% to 55% in children and 90% to 50% in adults (reflecting realistic ranges in free-living people) while increasing the other body components accordingly.

Multivariable linear regression models were used to predict CV measures across observed values of the multiplicative total. The totals were re-expressed in kg and plotted against predicted CV z-scores to aid interpretation. We also predicted CV measures across incremental values of total mass (in kg) in children (from 40 to 70 kg) and adults (from 60 to 120 kg).

Aim 2: To explore the combined associations of body composition and body mass with CV measures, we included both the body composition isometric log ratios and the multiplicative total in the same model.²⁷ We tested for interaction between body composition and multiplicative total and retained the interaction term if $p < 0.05$. The models were used to predict the value of the respective CV measure for the average body composition and body mass observed among participants classified as underweight, normal weight, overweight and obesity (child) and participants classified with normal weight, overweight, obesity class I, obesity class II and obesity class III (adult).²⁶ Predictions for each weight status group were plotted against raw values (body component percentages and total mass in kg). The models were checked for assumptions of linearity, normality of residuals, homogeneity of residuals variance and independence of residuals error terms.

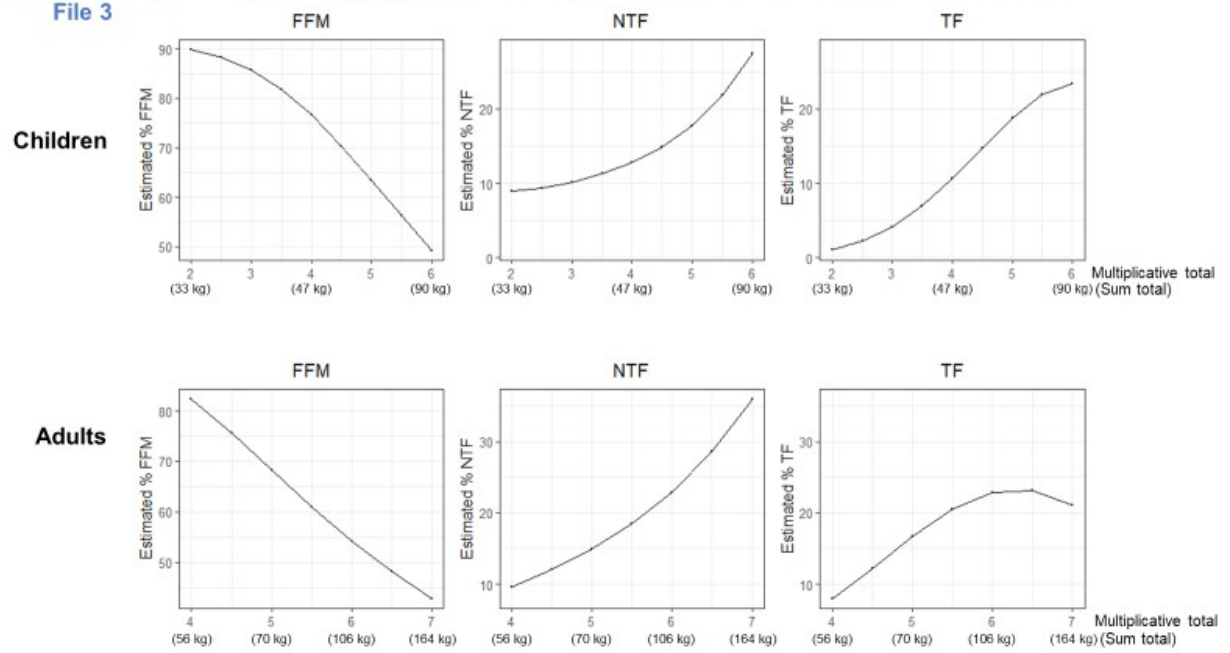
sFigure 1. Participants flowchart



sFigure 2.

Estimated body composition across total multiplicative body mass

Supplementary Figure. Estimated body composition across total multiplicative body mass



sTable 1: (CHILD MODELS) Associations between body composition and cardiovascular phenotypes at 11-12 years.

Cardiovascular phenotypes	Model parameters				Multivariate F-test		Model R ²
	Beta	SE	t value	p	F	p	
<i>PWV</i>							0.15
Body composition ilr1	1.54	0.2	8.3	<0.001	43.5	<0.001	
Body composition ilr2	-0.35	0.1	-4.2	<0.001			
Age (y)	0.33	0.1	4.6	<0.001			
Sex (ref = Female)	-0.16	0.1	-2.7	0.007			
SES (z-score)	-0.03	0.0	-1.1	0.28			
Puberty (ref = Pre)							
Puberty - Early	0.09	0.1	1.0	0.33			
Puberty - Mid	0.00	0.1	0.0	0.98			
Puberty - Late	-0.02	0.1	-0.2	0.87			
Puberty - Post	-0.21	0.5	-0.4	0.66			
Height (cm)	0.04	0.0	10.2	<0.001			
<i>Elasticity</i>							0.03
Body composition ilr1	-0.35	0.2	-1.7	0.10	5.1	0.006	
Body composition ilr2	-0.02	0.1	-0.2	0.83			
Age (y)	-0.26	0.1	-3.3	0.001			
Sex (ref = Female)	0.19	0.1	2.9	0.004			
SES (z-score)	0.00	0.0	-0.1	0.94			
Puberty - Early	-0.08	0.1	-0.7	0.47			
Puberty - Mid	-0.05	0.1	-0.5	0.62			
Puberty - Late	-0.03	0.1	-0.2	0.85			
Puberty - Post	0.64	0.5	1.3	0.21			
Height (cm)	0.00	0.0	-0.6	0.53			
<i>cIMT</i>							0.03
(Intercept)	1.93	0.9	2.1	0.04	4.9	0.008	
Body composition ilr1	-0.32	0.2	-1.6	0.10			
Body composition ilr2	0.25	0.1	2.9	0.004			
Age (y)	-0.23	0.1	-3.0	0.002			
Sex (ref = Female)	-0.11	0.1	-1.8	0.07			
SES (z-score)	-0.09	0.0	-3.3	0.001			
Puberty - Early	-0.16	0.1	-1.6	0.12			
Puberty - Mid	-0.24	0.1	-2.4	0.02			
Puberty - Late	-0.24	0.1	-1.9	0.06			
Puberty - Post	0.17	0.5	0.3	0.73			
Height (cm)	0.01	0.0	1.7	0.10			
<i>CRAE</i>							0.06
(Intercept)	1.12	1.0	1.1	0.267	4.0	0.02	
Body composition ilr1	-0.03	0.2	-0.1	0.89			
Body composition ilr2	-0.14	0.1	-1.5	0.139			
Age (y)	-0.12	0.1	-1.5	0.134			
Sex (ref = Female)	0.43	0.1	6.4	<0.001			
SES (z-score)	-0.01	0.0	-0.4	0.677			

Puberty - Early	-0.17	0.1	-1.5	0.132		
Puberty - Mid	-0.03	0.1	-0.3	0.754		
Puberty - Late	-0.16	0.1	-1.1	0.256		
Puberty - Post	-0.2	0.5	-0.4	0.692		
Height (cm)	0.0	0.0	-0.6	0.569		
<i>CRVE</i>						0.05
(Intercept)	-0.99	1.0	-1.0	0.331		
Body composition ilr1	0.58	0.2	2.7	0.007	3.7	0.03
Body composition ilr2	-0.19	0.1	-2.1	0.04		
Age (y)	0.09	0.1	1.1	0.27		
Sex (ref = Female)	0.33	0.1	4.9	<0.001		
SES (z-score)	0.02	0.0	0.7	0.514		
Puberty - Early	-0.03	0.1	-0.3	0.792		
Puberty - Mid	0.1	0.1	0.9	0.383		
Puberty - Late	-0.08	0.1	-0.6	0.578		
Puberty - Post	0.75	0.5	1.5	0.137		
Height (cm)	0.0	0.0	-0.1	0.886		
<i>Diastolic Blood Pressure</i>						0.06
Body composition ilr1	1.07	0.2	5.4	<0.001	29.73	<0.001
Body composition ilr2	-0.11	0.1	-1.3	0.209		
Age (y)	-0.12	0.1	-1.5	0.123		
Sex (ref = Female)	0.1	0.1	1.5	0.124		
SES (z-score)	-0.05	0.0	-1.7	0.094		
Puberty - Early	0.01	0.1	0.1	0.93		
Puberty - Mid	0.04	0.1	0.4	0.711		
Puberty - Late	0.03	0.1	0.2	0.849		
Puberty - Post	-0.61	0.5	-1.2	0.223		
Height (cm)	0.01	0.0	2.4	0.017		
<i>Systolic Blood Pressure</i>						0.16
Body composition ilr1	0.1	0.1	1.2	0.23	55.49	<0.001
Body composition ilr2	-0.11	0.1	-1.5	0.126		
Age (y)	-0.05	0.1	-0.9	0.38		
Sex (ref = Female)	-0.04	0.0	-1.5	0.144		
SES (z-score)	0.06	0.1	0.6	0.562		
Puberty - Early	0.11	0.1	1.1	0.272		
Puberty - Mid	0.18	0.1	1.5	0.145		
Puberty - Late	0.35	0.5	0.7	0.464		
Puberty - Post	0.03	0.0	8.2	<0.001		
Height (cm)	0.96	0.2	5.1	<0.001		

Definitions: $LR_{1FFM \text{ vs } TF \wedge NTF}$, $ILR_{2TF \wedge NTF}$

sTable 2: (ADULT MODELS) Associations between body composition and cardiovascular phenotypes.

Cardiovascular phenotypes	Model parameters				Multivariate F-test		Model R ²
	Beta	SE	t value	p	F	p	
<i>PWV</i>							0.24
Body composition ilr1	0.59	0.2	2.8	0.006	120.2	<0.001	
Body composition ilr2	1.24	0.3	4.0	<0.001			
Age (y)	0.04	0.0	8.4	<0.001			
Sex (ref = Female)	-0.66	0.1	-6.4	<0.001			
SES (z-score)	-0.06	0.0	-2.5	0.01			
Height (cm)	0.02	0.0	4.3	<0.001			
<i>Elasticity</i>							0.23
Body composition ilr1	-0.94	0.2	-4.7	<0.001	73.5	<0.001	
Body composition ilr2	-0.29	0.3	-1.0	0.32			
Age (y)	-0.06	0.0	-11.9	<0.001			
Sex (ref = Female)	0.84	0.1	7.8	<0.001			
SES (z-score)	-0.02	0.0	-0.9	0.39			
Height (cm)	0.00	0.0	0.6	0.56			
<i>cIMT</i>							0.19
Body composition ilr1	0.47	0.2	2.7	0.008	18.3	<0.001	
Body composition ilr2	0.06	0.3	0.2	0.82			
Age (y)	0.06	0.0	11.4	<0.001			
Sex (ref = Female)	-0.78	0.1	-8.0	<0.001			
SES (z-score)	-0.05	0.0	-1.8	0.07			
Height (cm)	0.01	0.0	3.4	0.001			
<i>CRAE</i>							0.06
Body composition ilr1	-0.22	0.2	-1.1	0.28	13.0	<0.001	
Body composition ilr2	-0.46	0.3	-1.4	0.15			
Age (y)	-0.03	0.0	-5.7	<0.001			
Sex (ref = Female)	0.31	0.1	2.7	0.007			
SES (z-score)	-0.02	0.0	-0.5	0.59			
Height (cm)	-0.01	.00	-1.3	0.21			
<i>CRVE</i>							0.04
Body composition ilr1	0.17	0.2	0.8	0.40	1.5	0.22	
Body composition ilr2	0.00	0.3	0.0	1.00			
Age (y)	-0.03	0.0	-5.2	<0.001			
Sex (ref = Female)	0.08	0.1	0.7	0.52			
SES (z-score)	-0.06	0.0	-1.9	0.05			
Height (cm)	0.00	0.0	-0.7	0.47			
<i>Diastolic Blood Pressure</i>							0.15
Body composition ilr1	0.6	0.2	3.1	0.002	75.62	<0.001	
Body composition ilr2	0.83	0.3	2.8	0.005			
Age (y)	0.01	0.0	2.5	0.012			
Sex (ref = Female)	-0.77	0.1	-7.4	<0.001			
SES (z-score)	-0.04	0.0	-1.6	0.116			

Height (cm)	0.01	0.0	1.3	0.18			
<i>Systolic Blood Pressure</i>							
Body composition ilr1	0.97	0.2	5.2	0.97	119.65	<0.001	0.22
Body composition ilr2	0.62	0.3	2.2	0.62			
Age (y)	0.01	0.0	2.9	0.01			
Sex (ref = Female)	-0.92	0.1	-9.3	-0.92			
SES (z-score)	-0.05	0.0	-1.8	-0.05			
Height (cm)	0.01	0.0	3.3	0.01			
Ilr=isometric log ratio							

Definitions: $LR_{1FFM\text{ vs }TF \wedge NTF}$, $ILR_{2TF \wedge NTF}$

sTable 3. Model-estimated z-scores and differences in CV phenotypes for selected simulated differences in body composition.

	%FFM	%NTF	%TF	Systolic BP	Diastolic BP	PWV	Elasticity	cIMT	CRAE	CRVE
CHILD	90	7.5	2.5	-0.49 [-0.60, -0.37]	-0.38 [-0.50, -0.25]	-0.45 [-0.56, -0.33]	0.17 [0.04, 0.30]	-0.09 [-0.22, 0.03]	0.16 [0.03, 0.30]	-0.05 [-0.18, 0.08]
	85	10	5	-0.21 [-0.29, -0.12]	-0.17 [-0.26, -0.08]	-0.24 [-0.32, -0.15]	0.07 [-0.02, 0.16]	-0.05 [-0.14, 0.03]	0.09 [0.00, 0.18]	-0.00 [-0.10, 0.09]
	75	15	10	0.20 [0.11, 0.28]	0.19 [0.09, 0.28]	0.19 [0.10, 0.27]	-0.07 [-0.17, 0.03]	-0.06 [-0.15, 0.03]	0.02 [-0.08, 0.11]	0.13 [0.03, 0.23]
	65	17.5	17.5	0.44 [0.33, 0.55]	0.36 [0.204, 0.48]	0.35 [0.24, 0.46]	-0.15 [-0.28, -0.02]	-0.02 [-0.13, 0.10]	-0.05 [-0.18, 0.07]	0.16 [0.04, 0.29]
	55	20	25	0.67 [0.52, 0.83]	0.56 [0.40, 0.72]	0.57 [0.42, 0.72]	-0.23 [-0.41, -0.06]	-0.01 [-0.16, 0.15]	-0.10 [-0.27, 0.07]	0.23 [0.06, 0.40]
ADULT	90	5	5	-1.04 [-1.22, -0.86]	-0.85 [-1.04, -0.66]	-1.13 [-1.31, -0.94]	0.81 [0.62, 1.00]	-0.24 [-0.42, -0.06]	0.41 [0.20, 0.63]	-0.21 [-0.42, 0.01]
	80	10	10	-0.28 [-0.39, -0.17]	-0.23 [-0.35, -0.12]	-0.38 [-0.49, -0.27]	0.17 [0.06, 0.29]	0.05 [-0.06, 0.16]	0.13 [0.00, 0.26]	-0.11 [-0.24, 0.03]
	70	15	15	0.22 [0.13, 0.32]	0.18 [0.08, 0.27]	0.12 [0.02, 0.22]	-0.25 [-0.35, -0.14]	0.25 [0.15, 0.34]	-0.06 [-0.17, 0.05]	-0.04 [-0.15, 0.07]
	60	20	20	0.64 [0.53, 0.75]	0.51 [0.40, 0.63]	0.53 [0.41, 0.65]	-0.59 [-0.71, -0.47]	0.40 [0.30, 0.51]	-0.21 [-0.34, -0.08]	0.01 [-0.11, 0.14]
	50	25	25	1.02 [0.87, 1.16]	0.82 [0.67, 0.97]	0.90 [0.74, 1.06]	-0.91 [-1.07, -0.75]	0.55 [0.41, 0.69]	-0.35 [-0.51, -0.19]	0.06 [-0.10, 0.23]

Abbreviations: CV=cardiovascular, FFM=fat-free mass, NTF=non-truncal fat, TF=truncal fat, PWV=pulse wave velocity, cIMT=carotid intima media thickness, CRAE=retinal arterial caliber, CRVE=retinal venular caliber. Body composition and body mass (expressed as multiplicative total) are considered in separate models (not mutually adjusted). All models are adjusted for age, sex, socioeconomic position, height and puberty (child models).

sTable 4: (CHILD MODELS) Associations between multiplicative total mass and cardiovascular phenotypes at 11-12 years. .

Cardiovascular phenotypes	Model parameters				Multivariate F-test		Model R ²
	Beta	SE	t-value	p	F	p	
<i>PWV</i>					37.43	<0.001	0.12
(Intercept)	-8.16	0.9	-9.0	<0.001			
Multiplicative total	0.23	0.0	6.1	<0.001			
Age (y)	0.35	0.1	4.7	<0.001			
Sex (ref = Female)	-0.13	0.1	-2.1	0.03			
SES (z-score)	-0.05	0.0	-1.7	0.09			
Puberty (ref = Pre)							
Puberty - Early	0.07	0.1	0.7	0.50			
Puberty - Mid	-0.06	0.1	-0.6	0.55			
Puberty - Late	-0.09	0.1	-0.7	0.48			
Puberty - Post	-0.26	0.5	-0.5	0.60			
Height (cm)	0.02	0.0	5.6	<0.001			
					17.12	<0.001	0.03
<i>Elasticity</i>							
(Intercept)	2.96	1.0	3.0	0.003			
Multiplicative total	-0.17	0.0	-4.1	<0.001			
Age (y)	-0.27	0.1	-3.4	0.001			
Sex (ref = Female)	0.19	0.1	2.9	0.004			
SES (z-score)	0.00	0.0	-0.1	0.91			
Puberty (ref = Pre)							
Puberty - Early	-0.06	0.1	-0.6	0.54			
Puberty - Mid	-0.03	0.1	-0.3	0.76			
Puberty - Late	0.01	0.1	0.1	0.96			
Puberty - Post	0.68	0.5	1.3	0.18			
Height (cm)	0.00	0.0	1.0	0.27			
					7.94	<0.001	0.03
<i>cIMT</i>							
(Intercept)	1.54	0.9	1.7	0.10			
Multiplicative total	0.11	0.0	2.8	0.005			
Age (y)	-0.23	0.1	-3.0	0.002			
Sex (ref = Female)	-0.12	0.1	-1.9	0.06			
SES (z-score)	-0.09	0.0	-3.1	0.002			
Puberty (ref = Pre)							
Puberty - Early	-0.15	0.1	-1.5	0.14			
Puberty - Mid	-0.23	0.1	-2.3	0.02			
Puberty - Late	-0.24	0.1	-1.8	0.07			
Puberty - Post	0.16	0.5	0.3	0.75			
Height (cm)	0.01	0.0	1.9	0.05			
					11.23	<0.001	0.06
<i>CRAE</i>							
(Intercept)	1.38	1.0	1.4	0.17			
Multiplicative total	-0.14	0.0	-3.4	0.001			
Age (y)	-0.13	0.1	-1.5	0.13			

Sex (ref = Female)	0.42	0.1	6.4	<0.001			
SES (z-score)	-0.01	0.0	-0.5	0.61			
Puberty (ref = Pre)							
Puberty - Early	-0.16	0.1	-1.5	0.14			
Puberty - Mid	-0.03	0.1	-0.3	0.77			
Puberty - Late	-0.14	0.1	-1.0	0.30			
Puberty - Post	-0.18	0.5	-0.4	0.72			
Height (cm)	0.00	0.0	0.1	0.91			
<i>CRVE</i>					0.63	0.43	0.04
(Intercept)	-0.75	1.0	-0.7	0.46			
Multiplicative total	0.03	0.0	0.8	0.43			
Age (y)	0.10	0.1	1.1	0.26			
Sex (ref = Female)	0.34	0.1	5.1	<0.001			
SES (z-score)	0.01	0.0	0.4	0.70			
Puberty (ref = Pre)							
Puberty - Early	-0.04	0.1	-0.4	0.70			
Puberty - Mid	0.07	0.1	0.6	0.54			
Puberty - Late	-0.10	0.1	-0.7	0.47			
Puberty - Post	0.73	0.5	1.4	0.15			
Height (cm)	-0.01	0.0	-1.5	0.12			
<i>Diastolic Blood Pressure</i>					39.34	<0.001	0.05
						1	
Multiplicative total	0.25	0.0	6.3	<0.001			
Age (y)	-0.12	0.1	-1.5	0.128			
Sex (ref = Female)	0.13	0.1	2.0	0.046			
SES (z-score)	-0.06	0.0	-2.1	0.038			
Puberty - Early	0.0	0.1	-0.1	0.958			
Puberty - Mid	0.0	0.1	0.0	0.977			
Puberty - Late	-0.02	0.1	-0.1	0.906			
Puberty - Post	-0.64	0.5	-1.3	0.204			
Height (cm)	0.0	0.0	-1.0	0.312			
<i>Systolic Blood Pressure</i>					136.16	<0.001	0.17
						1	
Multiplicative total	0.43	0.0	11.7	<0.001			
Age (y)	-0.11	0.1	-1.4	0.149			
Sex (ref = Female)	-0.03	0.1	-0.5	0.634			
SES (z-score)	-0.04	0.0	-1.6	0.101			
Puberty - Early	0.04	0.1	0.4	0.697			
Puberty - Mid	0.07	0.1	0.7	0.469			
Puberty - Late	0.12	0.1	1.0	0.339			
Puberty - Post	0.27	0.5	0.6	0.561			
Height (cm)	0.02	0.0	4	<0.001			

sTable 5. (ADULT MODELS) Associations between multiplicative total mass and cardiovascular phenotypes.

Cardiovascular phenotypes	Model parameters				Multivariate F-test		Model R ²
	Beta	SE	t-value	p	F	p	
<i>PWV</i>					246.80	<0.001	0.24
(Intercept)	-4.42	0.8	-5.3	<0.001			
Multiplicative total	0.73	0.0	15.7	<0.001			
Age (y)	0.04	0.0	8.8	<0.001			
Sex (ref = Female)	-0.51	0.1	-5.6	<0.001			
SES (z-score)	-0.06	0.0	-2.4	0.02			
Height (cm)	0.00	0.0	-0.4	0.70			
<i>Elasticity</i>					192.01	<0.001	0.25
(Intercept)	1.75	0.9	2.0	0.04			
Multiplicative total	-0.65	0.0	-13.9	<0.001			
Age (y)	-0.06	0.0	-12.5	<0.001			
Sex (ref = Female)	0.63	0.1	6.5	<0.001			
SES (z-score)	-0.04	0.0	-1.3	0.20			
Height (cm)	0.02	0.0	4.7	<0.001			
<i>cIMT</i>					49.00	<0.001	0.20
(Intercept)	-3.64	0.8	-4.5	<0.001			
Multiplicative total	0.30	0.0	7.0	<0.001			
Age (y)	0.06	0.0	11.6	<0.001			
Sex (ref = Female)	-0.68	0.1	-7.6	<0.001			
SES (z-score)	-0.04	0.0	-1.5	0.12			
Height (cm)	0.00	0.0	1.4	0.16			
<i>CRAE</i>					33.00	<0.001	0.06
(Intercept)	2.18	1.0	2.3	0.02			
Multiplicative total	-0.29	0.1	-5.7	<0.001			
Age (y)	-0.03	0.0	-5.9	<0.001			
Sex (ref = Female)	0.27	0.1	2.6	0.01			
SES (z-score)	-0.02	0.0	-0.7	0.46			
Height (cm)	0.00	0.0	0.4	0.67			
<i>CRVE</i>					0.89	0.35	0.04
(Intercept)	1.78	1.0	1.8	0.07			
Multiplicative total	0.05	0.1	0.9	0.35			
Age (y)	-0.03	0.0	-5.2	<0.001			
Sex (ref = Female)	0.12	0.1	1.1	0.26			
SES (z-score)	-0.06	0.0	-2.1	0.04			
Height (cm)	0.00	0.0	-1.2	0.24			
<i>Diastolic Blood Pressure</i>					165.53	<0.001	0.16
Multiplicative total	0.60	0.0	12.9	<0.001			
Age (y)	0.01	0.0	2.9	0.004			
Sex (ref = Female)	-0.63	0.1	-6.7	<0.001			
SES (z-score)	-0.04	0.0	-1.4	0.16			
Height (cm)	-0.01	0.0	-2.5	0.01			

<i>Systolic Blood Pressure</i>					329.45	<0.001	0.26
Multiplicative total	0.79	0.0	18.2	<0.001			
Age (y)	0.02	0.0	3.4	0.001			
Sex (ref = Female)	-0.70	0.1	-7.9	<0.001			
SES (z-score)	-0.03	0.0	-1.3	0.19			
Height (cm)	-0.01	0.0	-1.9	0.06			

sTable 6. Model-estimated z-scores and differences in CV phenotypes for selected simulated differences in body mass

	Mass (kg)	Multiplicative mass	Systolic BP	Diastolic BP	PWV	Elasticity	cIMT	CRAE	CRVE
CHILD	40	3.38	-0.13 [-0.21, -0.06]	-0.07 [-0.15, 0.01]	-0.11 [-0.03, -0.19]	0.05 [-0.03, 0.14]	-0.08 [-0.00, 0.16]	0.09 [0.00, 0.17]	0.04 [0.13, -0.04]
	50	4.11	0.18 [0.11, 0.26]	0.11 [0.03, 0.19]	0.06 [0.14, -0.02]	-0.07 [-0.16, 0.01]	-0.00 [0.08, -0.08]	-0.01 [-0.10, 0.07]	0.07 [0.16, 0.02]
	60	4.69	0.43 [0.33, 0.53]	0.25 [0.14, 0.36]	0.19 [0.29, 0.09]	-0.17 [-0.29, -0.06]	0.06 [0.17, -0.04]	-0.09 [-0.20, 0.02]	0.09 [0.20, -0.03]
	70	5.11	0.61 [0.49, 0.74]	0.36 [0.22, 0.49]	0.29 [0.41, 0.16]	-0.24 [-0.38, -0.10]	0.11 [0.24, -0.02]	-0.15 [-0.29, -0.01]	0.10 [0.24, -0.04]
ADULT	60	4.6	-0.14 [-0.23, -0.05]	-0.07 [-0.17, 0.02]	-0.16 [-0.06, -0.25]	0.07 [-0.03, 0.17]	0.09 [0.18, 0.00]	0.06 [-0.05, 0.16]	-0.07 [0.04, -0.17]
	80	5.28	0.39 [0.31, 0.47]	0.33 [0.25, 0.42]	0.34 [0.43, 0.26]	-0.37 [-0.46, -0.28]	0.29 [0.37, 0.21]	-0.14 [-0.24, -0.05]	-0.04 [0.06, -0.13]
	100	5.82	0.82 [0.72, 0.92]	0.65 [0.55, 0.76]	0.74 [0.84, 0.63]	-0.72 [-0.83, -0.61]	0.46 [0.55, 0.36]	-0.30 [-0.42, -0.18]	-0.01 [0.11, -0.13]
	120	6.21	1.13 [1.00, 1.25]	0.89 [0.76, 1.02]	1.03 [1.16, 0.89]	-0.97 [-1.11, -0.84]	0.57 [0.70, 0.45]	-0.41 [-0.56, -0.27]	0.01 [0.16, -0.14]

Abbreviations: CV=cardiovascular, FFM=fat-free mass, NTF=non-truncal fat, TF=truncal fat, PWV=pulse wave velocity, cIMT=carotid intima media thickness, CRAE=retinal arterial caliber, CRVE=retinal venular caliber. Body composition and body mass (expressed as multiplicative total) are considered in separate models (not mutually adjusted). All models are adjusted for age, sex, socioeconomic position, height and puberty (child models).

sTable 7. Body composition of different weight status.

Weight status	Fat-free mass %	Non- truncal fat %	Truncal fat %
Children			
Underweight	87.5	10.3	2.2
Normal weight	81.8	11.5	6.7
Overweight	69.6	15.4	15.0
Obesity	59.9	19.5	20.6
Adults			
Normal weight	74.0	12.9	13.1
Overweight	66.5	15.8	17.7
Obesity class I	59.6	19.3	21.1
Obesity class II	54.6	22.4	23.0
Obesity class III	49.4	27.5	23.1

sTable 8. (CHILD MODELS) Combined associations between body composition, multiplicative total mass and cardiovascular phenotypes at 11-12 years. .

Cardiovascular phenotypes	Model parameters				Multivariate-F test		Model R ²
	Beta	SE	t-value	p	F	p	
<i>PWV</i>							0.16
(Intercept)	-10.93	1.1	-9.8	<0.001			
Body composition ilr1	-0.79	0.9	-0.8	0.40	25.7	<0.001	
Body composition ilr2	-0.12	0.3	-0.4	0.66			
Multiplicative total	0.85	0.3	3.3	0.001	2.43	0.09	
Age (y)	0.33	0.1	4.5	<0.001			
Sex (ref = Female)	-0.12	0.1	-2.0	0.05			
SES (z-score)	-0.03	0.0	-1.1	0.26			
Puberty (ref = Pre)							
Puberty - Early	0.10	0.1	1.0	0.32			
Puberty - Mid	-0.01	0.1	-0.2	0.88			
Puberty - Late	-0.01	0.1	-0.1	0.91			
Puberty - Post	-0.20	0.5	-0.4	0.67			
Height (cm)	0.03	0.0	4.3	<0.001			
Interaction Body composition ilr1 with Multiplicative total	0.54	0.2	2.7	0.007	5.1	0.006	
Interaction Body composition ilr2 with Multiplicative total	-0.18	0.1	-1.9	0.06			
<i>Elasticity</i>							0.06
(Intercept)	5.37	1.1	5.1	<0.001			
Body composition ilr1	1.21	0.3	3.8	<0.001	17.6	<0.001	
Body composition ilr2	1.19	0.2	5.8	<0.001			
Multiplicative total	-1.45	0.2	-6.5	<0.001	42.3	<0.001	
Age (y)	-0.25	0.1	-3.1	0.002			
Sex (ref = Female)	0.11	0.1	1.7	0.10			
SES (z-score)	0.00	0.0	0.0	0.98			
Puberty (ref = Pre)							
Puberty - Early	-0.08	0.1	-0.7	0.48			
Puberty - Mid	-0.02	0.1	-0.2	0.82			
Puberty - Late	0.07	0.1	0.5	0.60			
Puberty - Post	0.76	0.5	1.5	0.13			
Height (cm)	0.04	0.0	4.9	<0.001			
<i>cIMT</i>							0.04
(Intercept)	0.74	1.0	0.7	0.46			
Body composition ilr1	-1.09	0.3	-3.6	<0.001	6.6	0.001	
Body composition ilr2	-0.35	0.2	-1.8	0.08			
Multiplicative total	0.71	0.2	3.4	0.001	11.3	<0.001	
Age (y)	-0.24	0.1	-3.2	0.002			
Sex (ref = Female)	-0.08	0.1	-1.2	0.23			
SES (z-score)	-0.09	0.0	-3.3	0.001			
Puberty (ref = Pre)							
Puberty - Early	-0.16	0.1	-1.6	0.12			
Puberty - Mid	-0.26	0.1	-2.5	0.01			
Puberty - Late	-0.29	0.1	-2.2	0.03			

Puberty - Post	0.12	0.5	0.2	0.81			
Height (cm)	-0.01	0.0	-1.8	0.08			
<i>CRAE</i>							0.07
(Intercept)	2.45	1.1	2.3	0.02			
Body composition ilr1	0.84	0.3	2.5	0.01	4.1	0.02	
Body composition ilr2	0.49	0.2	2.4	0.02			
Multiplicative total	-0.76	0.2	-3.4	0.001	11.4	<0.001	
Age (y)	-0.12	0.1	-1.4	0.15			
Sex (ref = Female)	0.38	0.1	5.7	<0.001			
SES (z-score)	-0.01	0.0	-0.4	0.71			
Puberty (ref = Pre)							
Puberty - Early	-0.16	0.1	-1.5	0.14			
Puberty - Mid	-0.02	0.1	-0.1	0.88			
Puberty - Late	-0.10	0.1	-0.7	0.49			
Puberty - Post	-0.14	0.5	-0.3	0.79			
Height (cm)	0.02	0.0	2.4	0.02			
<i>CRVE</i>							0.05
(Intercept)	-0.81	1.1	-0.7	0.46			
Body composition ilr1	0.70	0.3	2.1	0.04	3.5	0.03	
Body composition ilr2	-0.11	0.2	-0.5	0.60			
Multiplicative total	-0.10	0.2	-0.5	0.65	0.2	0.65	
Age (y)	0.09	0.1	1.1	0.27			
Sex (ref = Female)	0.32	0.1	4.7	<0.001			
SES (z-score)	0.02	0.0	0.7	0.51			
Puberty - Early	-0.03	0.1	-0.3	0.80			
Puberty - Mid	0.10	0.1	0.9	0.37			
Puberty - Late	-0.07	0.1	-0.5	0.62			
Puberty - Post	0.76	0.5	1.5	0.13			
Height (cm)	0.00	0.0	0.3	0.77			
<i>Diastolic Blood Pressure</i>							0.06
Body composition ilr1	1.22	0.3	4.0	<0.001	10.01	<0.001	
Body composition ilr2	0.00	0.2	0.0	0.98			
Multiplicative total	-0.14	0.2	-0.6	0.53			
Age (y)	-0.12	0.1	-1.5	0.13			
Sex (ref = Female)	0.09	0.1	1.4	0.16			
SES (z-score)	-0.05	0.0	-1.7	0.10			
Puberty - Early	0.01	0.1	0.1	0.93			
Puberty - Mid	0.04	0.1	0.4	0.70			
Puberty - Late	0.03	0.1	0.3	0.80			
Puberty - Post	-0.6	0.5	-1.2	0.23			
Height (cm)	0.01	0.0	1.9	0.06			
<i>Systolic Blood Pressure</i>							0.21
Body composition ilr1	-3.28	0.9	-3.6	<0.001	30.00	<0.001	
Body composition ilr2	-0.86	0.3	-3.1	0.002			
Multiplicative total	2.22	0.3	8.7	<0.001			

Age (y)	-0.14	0.1	-1.9	0.06
Sex (ref = Female)	0.07	0.1	1.1	0.27
SES (z-score)	-0.04	0.0	-1.6	0.10
Puberty - Early	0.05	0.1	0.5	0.58
Puberty - Mid	0.06	0.1	0.7	0.50
Puberty - Late	0.07	0.1	0.6	0.54
Puberty - Post	0.22	0.5	0.5	0.63
Height (cm)	-0.02	0.0	-2.5	0.01
Body composition ILR1*	0.53	0.2	2.7	0.006
Multiplicative total body mass				
Body composition ILR2*				
Multiplicative total body mass	-0.03	0.1	-0.3	0.73

Definitions: $LR_{1FFM\text{ vs }TF \wedge NTF}$, $ILR_{2TF \wedge NTF}$

sTable 9. (ADULT MODELS) Combined associations between body composition, multiplicative total mass and cardiovascular phenotypes.

Cardiovascular phenotypes	Model parameters				Multivariate F-test		Model R ²
	beta	SE	t value	p-value	MeasureF	pMeasure	
<i>PWV</i>							0.26
(Intercept)	-6.39	1.2	-5.1	<0.001			
Body composition ilr1	-1.50	1.5	-1.0	0.33	2.5	0.08	
Body composition ilr2	-1.69	1.9	-0.9	0.38			
Multiplicative total	0.90	0.2	4.5	<0.001	10.2	0.001	
Age (y)	0.04	0.0	8.8	<0.001			
Sex (ref = Female)	-0.50	0.1	-4.5	<0.001			
SES (z-score)	-0.05	0.0	-1.9	0.06			
Height (cm)	0.01	0.0	1.5	0.13			
Interaction Body composition ilr1 with Multiplicative total	0.22	0.3	0.8	0.43	6.6	0.001	
Interaction Body composition ilr2 with Multiplicative total	0.76	0.4	2.0	0.049			
<i>Elasticity</i>							0.27
(Intercept)	5.53	1.3	4.4	<0.001			
Body composition ilr1	1.70	1.5	1.1	0.25	6.0	0.003	
Body composition ilr2	2.94	1.8	1.7	0.10			
Multiplicative total	-1.53	0.2	-7.4	<0.001	52.4	<0.001	
Age (y)	-0.07	0.0	-12.9	<0.001			
Sex (ref = Female)	0.47	0.1	4.1	<0.001			
SES (z-score)	-0.04	0.0	-1.6	0.12			
Height (cm)	0.03	0.0	4.9	<0.001			
Interaction Body composition ilr1 with Multiplicative total	-0.16	0.3	-0.6	0.55	4.9	0.008	
Interaction Body composition ilr2 with Multiplicative total	-0.66	0.3	-2.0	0.05			
<i>cIMT</i>							0.20
(Intercept)	-4.67	0.9	-5.0	<0.001			
Body composition ilr1	-0.43	0.3	-1.6	0.12	2.8	0.06	
Body composition ilr2	-0.41	0.3	-1.4	0.16			
Multiplicative total	0.63	0.2	4.2	<0.001	17.6	<0.001	
Age (y)	0.06	0.0	11.8	<0.001			
Sex (ref = Female)	-0.58	0.1	-5.3	<0.001			
SES (z-score)	-0.04	0.0	-1.6	0.12			
Height (cm)	0.00	0.0	-0.7	0.48			
<i>CRAE</i>							0.07
(Intercept)	3.20	1.1	2.9	0.004			
Body composition ilr1	0.63	0.3	1.9	0.06	1.9	0.16	
Body composition ilr2	-0.04	0.3	-0.1	0.92			
Multiplicative total	-0.59	0.2	-3.3	0.001	10.7	0.001	
Age (y)	-0.04	0.0	-6.0	<0.001			
Sex (ref = Female)	0.12	0.1	0.9	0.34			
SES (z-score)	-0.02	0.0	-0.8	0.42			

Height (cm)	0.01	0.0	1.6	0.12			
<i>CRVE</i>							0.05
(Intercept)	3.38	1.1	3	0.002			
Body composition ilr1	0.85	0.3	2.5	0.01	4.3	0.01	
Body composition ilr2	0.33	0.3	1.0	0.34			
Multiplicative total	-0.46	0.2	-2.5	0.01	6.5	0.01	
Age (y)	-0.03	0.0	-5.5	<0.001			
Sex (ref = Female)	-0.07	0.1	-0.6	0.58			
SES (z-score)	-0.06	0.0	-2.1	0.03			
Height (cm)	0.01	0.0	1.4	0.17			
<i>Diastolic Blood Pressure</i>							0.17
Body composition ilr1	-2.61	1.5	-1.8	0.08	0.81	0.45	
Body composition ilr2	-0.43	1.8	-0.2	0.81			
Multiplicative total	1.02	0.2	4.9	<0.001			
Age (y)	0.01	0.0	2.9	0.004			
Sex (ref = Female)	-0.56	0.1	-4.9	<0.001			
SES (z-score)	-0.03	0.0	-1.0	0.34			
Height (cm)	-0.01	0.0	-1.1	0.28			
<i>Systolic Blood Pressure</i>							0.29
Body composition ilr1	-5.12	1.4	-3.7	<0.001	14.42	<0.001	
Body composition ilr2	-1.09	1.6	-0.7	0.50			
Multiplicative total	2.15	0.2	11.3	<0.001			
Age (y)	0.02	0.0	4.0	<0.001			
Sex (ref = Female)	-0.42	0.1	-3.9	<0.001			
SES (z-score)	-0.02	0.0	-0.7	0.51			
Height (cm)	-0.02	0.0	-3.9	<0.001			
Body composition ILR1 *							
Multiplicative total body mass	0.68	0.2	2.7	0.006			
Body composition ILR2 *							
Multiplicative total body mass	0.47	0.3	1.5	0.13			

Definitions: $LR_{1FFM\text{ vs }TF \wedge NTF}$, $ILR_{2TF \wedge NTF}$

sTable 10. Sensitivity analysis of combined associations between body composition, multiplicative total mass and cardiovascular phenotypes in CHILDREN at 11-12 years (additionally adjusted for physical activity, smoking and C-reactive protein).

Cardiovascular phenotypes	Model parameters				Multivariate F-test		Model R ²
	Beta	SE	t-value	p	F value	p	
Systolic blood pressure							
Body composition ilr1	-0.91	0.4	-2.3	0.02	12.72	<0.001	0.20
Body composition ilr2	-1.30	0.3	-5.0	<0.001			
Multiplicative total	1.69	0.3	6.1	<0.001			
Age (y)	-0.10	0.10	-0.98	0.33			
Sex (ref = Female)	0.12	0.08	1.33	0.18			
SES (z-score)	-0.02	0.04	-0.40	0.69			
Height (cm)	-0.02	0.01	-1.81	0.07			
Puberty - Early	0.05	0.13	0.37	0.71			
Puberty - Mid	0.04	0.13	0.30	0.76			
Puberty - Late	0.05	0.17	0.29	0.78			
Puberty - Post	0.16	0.47	0.34	0.73			
Activity ilr 1	-0.12	0.31	-0.38	0.70			
Activity ilr 2	-0.40	0.18	-2.21	0.03			
Activity ilr 3	0.01	0.07	0.09	0.93			
C-reactive protein	0.04	0.03	1.33	0.18			
Cigarette smoking	0.10	0.09	1.11	0.27			
Diastolic blood pressure							
Body composition ilr1	1.17	0.43	2.69	0.01	3.92	0.02	0.08
Body composition ilr2	0.16	0.28	0.57	0.57			
Multiplicative total	-0.25	0.30	-0.81	0.42			
Age (y)	-0.08	0.11	-0.76	0.45			
Sex (ref = Female)	0.05	0.09	0.48	0.63			
SES (z-score)	-0.05	0.04	-1.24	0.22			
Height (cm)	0.01	0.01	1.33	0.18			
Puberty - Early	0.01	0.14	0.07	0.94			
Puberty - Mid	-0.07	0.14	-0.51	0.61			
Puberty - Late	-0.002	0.18	-0.01	0.99			
Puberty - Post	-0.67	0.51	-1.31	0.19			
Activity ilr 1	0.26	0.34	0.78	0.43			
Activity ilr 2	-0.02	0.20	-0.08	0.93			
Activity ilr 3	-0.10	0.08	-1.27	0.20			
C-reactive protein	0.04	0.04	1.26	0.21			
Cigarette smoking	0.07	0.10	0.67	0.50			
PWV							
(Intercept)	-0.93	1.6	-6.3	<0.001			
Body composition ilr1	-1.38	1.4	1.0	0.33	11.74	<0.001	0.18
Body composition ilr2	-0.34	0.4	-0.9	0.40			
Multiplicative total	1.04	0.4	2.9	0.004			
Age (y)	0.27	0.1	2.7	0.006			
Sex (ref = Female)	-0.15	0.1	-1.7	0.10			

SES (z-score)	-0.04	0.0	-0.9	0.36			
Height (cm)	0.02	0.0	1.9	0.06			
Puberty (ref = Pre)							
Puberty – Early	0.03	0.1	0.2	0.81			
Puberty – Mid	-0.06	0.1	-0.5	0.61			
Puberty – Late	-0.02	0.2	-0.1	0.90			
Puberty - Post	-0.24	0.5	-0.5	0.62			
Activity ilr 1	0.37	0.3	1.2	0.23			
Activity ilr 2	0.01	0.2	0.1	0.94			
Activity ilr 3	-0.07	0.1	-1.0	0.32			
C-reactive protein	0.04	0.1	1.5	0.14			
Passive smoking	-0.12	0.1	-1.3	0.19			
<i>Elasticity</i>							
(Intercept)	5.09	1.5	3.4	0.001			
Body composition ilr1	1.41	0.4	3.2	0.002	8.74	<0.001	0.07
Body composition ilr2	1.10	0.3	3.9	<0.001			
Multiplicative total	-1.45	0.3	-4.7	<0.001			
Age (y)	-0.23	0.1	-2.1	0.03			
Sex (ref = Female)	0.02	0.1	0.3	0.80			
SES (z-score)	-0.04	0.0	-0.8	0.40			
Height (cm)	0.04	0.0	4.0	<0.001			
Puberty (ref = Pre)							
Puberty - Early	-0.20	0.1	-1.4	0.15			
Puberty - Mid	-0.06	0.1	-0.5	0.65			
Puberty - Late	0.00	0.2	0.1	0.99			
Puberty - Post	0.69	0.5	1.3	0.19			
Activity ilr 1	0.52	0.3	1.5	0.12			
Activity ilr 2	0.47	0.2	2.4	0.02			
Activity ilr 3	-0.06	0.1	-0.8	0.42			
C-reactive protein	0.00	0.0	-0.1	0.93			
Passive smoking	0.06	0.1	0.6	0.55			
<i>cIMT</i>							
(Intercept)	-1.65	1.4	-1.2	0.23			
Body composition ilr1	-1.08	0.4	-2.6	0.009	3.49	0.03	0.07
Body composition ilr2	-0.22	0.3	-0.8	0.40			
Multiplicative total	0.62	0.3	2.2	0.03			
Age (y)	-0.10	0.1	-0.9	0.35			
Sex (ref = Female)	0.01	0.1	0.1	0.93			
SES (z-score)	-0.13	0.0	-3.1	0.002			
Height (cm)	0.00	0.0	-0.4	0.68			
Puberty (ref = Pre)							
Puberty - Early	-0.21	0.1	-1.6	0.11			
Puberty - Mid	-0.37	0.1	-2.9	0.004			
Puberty - Late	-0.59	0.2	-3.4	0.001			
Puberty - Post	0.08	0.5	0.2	0.88			
Activity ilr 1	-0.20	0.3	-0.6	0.54			
Activity ilr 2	0.04	0.2	0.2	0.81			

sTable 11. Sensitivity analysis of combined associations between body composition, multiplicative total mass and cardiovascular phenotypes in ADULTS (additionally adjusted for physical activity, smoking and C-reactive protein).

Cardiovascular phenotypes	Model parameters				Multivariate F-test		Model R2
	Beta	SE	t-value	p	F-value	p	
<i>Systolic blood pressure</i>							<u>0.28</u>
Body composition ilr1	-0.89	0.34	-2.60	0.01	<u>7.56</u>	<u><0.01</u>	
Body composition ilr2	-0.83	0.38	-2.16	0.03			
Multiplicative total	1.46	0.19	7.86	0.000			
Age (y)	0.02	0.01	3.31	0.001			
Sex (ref = Female)	-0.49	0.14	-3.63	0.00			
SES (z-score)	-0.03	0.03	-0.90	0.37			
Height (cm)	-0.02	0.01	-3.52	0.00			
Activity ilr 1	0.10	0.20	0.51	0.61			
Activity ilr 2	0.13	0.14	0.97	0.33			
Activity ilr 3	0.13	0.08	1.58	0.12			
C-reactive protein	0.02	0.01	2.19	0.03			
Cigarette smoking	0.02	0.11	0.19	0.85			
Body composition ILR1 *							
Multiplicative total body mass	-0.89	0.34	-2.60	0.01			
Body composition ILR2 *							
Multiplicative total body mass	-0.83	0.38	-2.16	0.03			
<i>Diastolic blood pressure</i>							<u>0.17</u>
Body composition ilr1	-0.06	0.37	-0.16	0.87	<u>0.01</u>	<u>0.99</u>	
Body composition ilr2	0.03	0.41	0.08	0.94			
Multiplicative total	0.61	0.20	3.06	0.002			
Age (y)	0.02	0.01	2.47	0.01			
Sex (ref = Female)	-0.60	0.15	-4.07	0.00			
SES (z-score)	-0.02	0.03	-0.63	0.53			
Height (cm)	-0.01	0.01	-0.87	0.39			
Activity ilr 1	-0.16	0.22	-0.71	0.48			
Activity ilr 2	0.03	0.15	0.18	0.86			
Activity ilr 3	0.07	0.09	0.83	0.41			
C-reactive protein	0.02	0.01	2.01	0.04			
Cigarette smoking	0.04	0.11	0.39	0.70			
<i>PWV</i>							
Body composition ilr1	-0.02	1.8	0.0	0.99	<u>1.30</u>	<u>0.27</u>	<u>0.25</u>
Body composition ilr2	-2.74	2.3	-1.2	0.24			
Multiplicative total	0.79	0.2	3.2	0.001			
Age (y)	0.04	0.0	6.4	<0.001			
Sex (ref = Female)	-0.45	0.1	-3.1	0.002			
SES (z-score)	-0.02	0.0	-0.5	0.62			
Height (cm)	0.01	0.0	1.6	0.12			
Activity ilr 1	-0.20	0.2	-0.9	0.35			
Activity ilr 2	0.18	0.1	1.2	0.21			
Activity ilr 3	-0.03	0.1	-0.3	0.74			

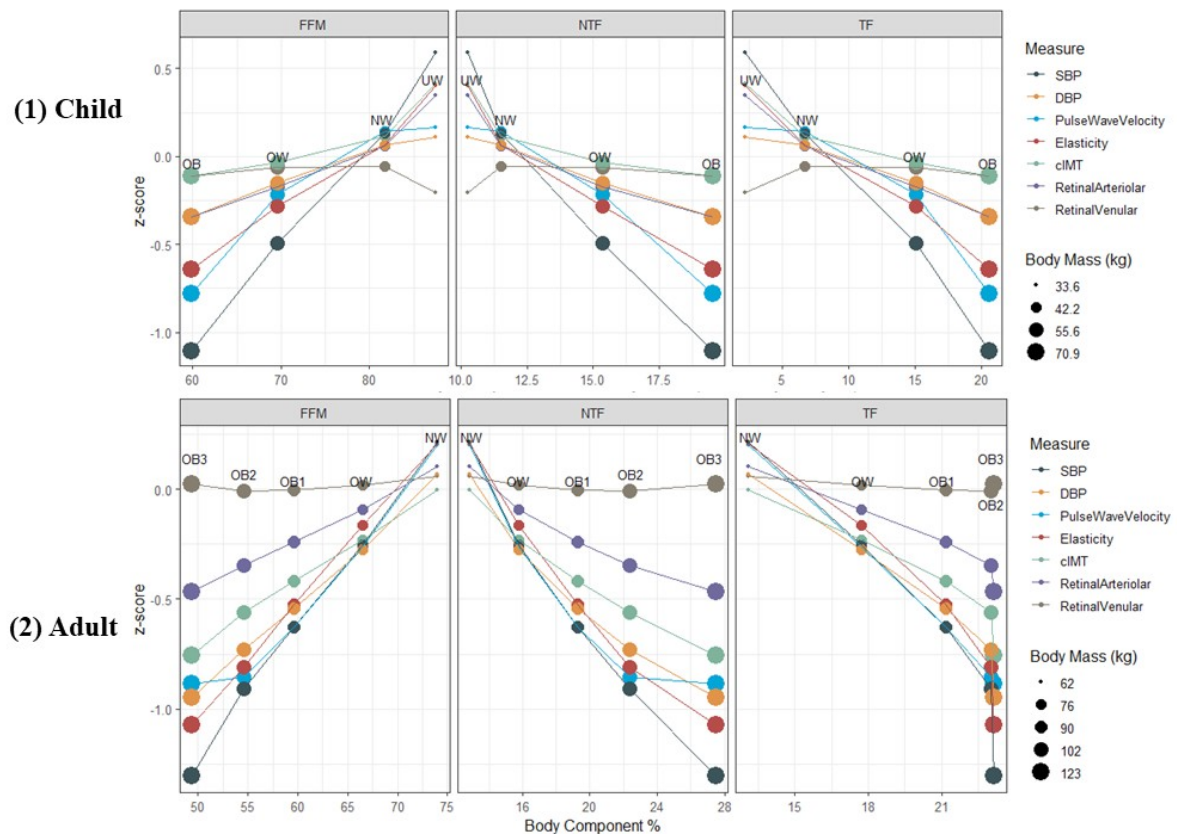
	C-reactive protein	0.01	0.0	1.6	0.12		
	Cigarette smoking	-0.16	0.1	-1.5	0.14		
	<i>Elasticity</i>						<u>0.23</u>
	Body composition ilr1	2.61	1.9	1.4	0.16	<u>3.28</u>	<u>0.04</u>
	Body composition ilr2	2.11	2.2	0.9	0.35		
	Multiplicative total	-1.48	0.2	-5.9	<0.001		
	Age (y)	-0.06	0.0	-9.3	<0.001		
	Sex (ref = Female)	0.36	0.1	2.4	0.02		
	SES (z-score)	-0.04	0.0	-1.2	0.24		
	Height (cm)	0.03	0.0	3.4	0.001		
	Activity ilr 1	-0.28	0.2	-1.3	0.19		
	Activity ilr 2	-0.13	0.1	-0.9	0.38		
	Activity ilr 3	0.00	0.1	0.0	0.99		
	C-reactive protein	0.00	0.0	0.5	0.62		
	Cigarette smoking	-0.07	0.1	-0.7	0.50		
	<i>cIMT</i>						<u>0.23</u>
	Body composition ilr1	-0.08	0.3	-0.2	0.82	<u>0.38</u>	<u>0.68</u>
	Body composition ilr2	-0.29	0.4	-0.8	0.45		
	Multiplicative total	0.53	0.2	2.9	0.004		
	Age (y)	0.06	0.0	10.7	<0.001		
	Sex (ref = Female)	-0.64	0.1	-4.7	<0.001		
	SES (z-score)	-0.01	0.0	-0.4	0.68		
	Height (cm)	0.00	0.0	0.3	0.79		
	Activity ilr 1	-0.32	0.2	-1.5	0.12		
	Activity ilr 2	-0.08	0.1	-0.6	0.55		
	Activity ilr 3	0.12	0.1	1.5	0.13		
	C-reactive protein	0.00	0.0	0.5	0.65		
	Cigarette smoking	0.07	0.1	0.7	0.50		
	<i>CRAE</i>						0.09
	Body composition ilr1	0.21	0.4	0.5	0.60	<u>0.16</u>	<u>0.85</u>
	Body composition ilr2	0.03	0.4	0.1	0.95		
	Multiplicative total	-0.44	0.2	-2.0	0.04		
	Age (y)	-0.03	0.0	-5.0	<0.001		
	Sex (ref = Female)	0.15	0.2	0.9	0.35		
	SES (z-score)	-0.01	0.0	-0.2	0.81		
	Height	0.00	0.0	0.4	0.71		
	Activity ilr 1	-0.19	0.2	-0.8	0.42		
	Activity ilr 2	0.07	0.2	0.4	0.67		
	Activity ilr 3	-0.16	0.1	-1.7	0.09		
	C-reactive protein	-0.01	0.0	-1.6	0.11		
	Cigarette smoking	0.29	0.1	2.4	0.02		
	<i>CRVE</i>						<u>0.06</u>
	Body composition ilr1	0.50	0.4	1.2	0.23	<u>1.88</u>	<u>0.15</u>
	Body composition ilr2	0.53	0.4	1.2	0.24		
	Multiplicative total	-0.32	0.2	-1.4	0.15		

Age (y)	-0.03	0.0	-4.1	<0.001
Sex (ref = Female)	0.05	0.2	0.3	0.74
SES (z-score)	-0.07	0.0	-1.8	0.07
Height (cm)	0.01	0.0	0.8	0.44
Activity ilr 1	-0.04	0.2	-0.2	0.86
Activity ilr 2	0.22	0.2	1.4	0.17
Activity ilr 3	-0.04	0.1	-0.4	0.69
C-reactive protein	-0.04	0.0	-1.5	0.14
Cigarette smoking	0.28	0.1	2.2	0.03

Definitions: $LR_{1FFM \text{ vs } TF \wedge NTF}$, $ILR_{2TF \wedge NTF}$; ILR_1 sleep and sedentary time vs light PA & MVPA; ILR_2 sleep vs sedentary time; ILR_3

light PA vs MVPA

sFigure 3. Additional adjustment for 24-h activity composition (sleep, sedentary behaviour, light physical activity, moderate to vigorous physical activity), C-reactive protein and smoking in compositional analysis models



All models adjusted for age, sex, family socioeconomic position, height and puberty (child only), and additionally physical activity, CRP and smoking. FFM=fat-free mass, NTF=non-truncal fat, TF=truncal fat, OB=obesity, OW=overweight, NW=normal weight, UW=underweight. z-scores for carotid intima-media thickness (cIMT), pulse wave velocity (PWV) and retinal vascular calibre reversed so that an increase always represents a favourable difference.