Childhood body composition trajectories and adolescent lung function: Findings from the ALSPAC study

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ONLINE SUPPLEMENT

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References

Study population

ALSPAC recruited 14,541 pregnant women residents in Avon, UK, with expected dates of delivery between the 1st of April, 1991, and the 31st of December 1992. 14,541 is the *initial* number of pregnancies for which the mother enrolled in the ALSPAC study and had either returned at least one questionnaire or attended a "Children in Focus" clinic by 19/07/99. Of these *initial* pregnancies, there was a total of 14,676 fetuses, resulting in 14,062 live births and 13,988 children who were alive at 1 year of age.

When the oldest children were approximately 7 years of age, an attempt was made to bolster the initial sample with eligible cases who had failed to join the study originally. As a result, when considering variables collected from the age of seven onwards (and potentially abstracted from obstetric notes) there are data available for more than the 14,541 pregnancies mentioned above. The number of new pregnancies not in the initial sample (known as Phase I enrolment) that are currently represented on the built files and reflecting enrolment status at the age of 18 is 706 (452 and 254 recruited during Phases II and III respectively), resulting in an additional 713 children being enrolled. The phases of enrolment are described in more detail in the cohort profile paper (E1, E2).

The total sample size for analyses using any data collected after the age of seven is therefore 15,247 pregnancies, resulting in 15,458 fetuses. Of this total sample of 15,458 fetuses, 14,775 were live births and 14,701 (including 14,305 singleton births) were alive at 1 year of age.

The study website contains details of all the data that are available through a fully searchable data dictionary at www.bris.ac.uk/alspac/researchers/data-access/data-dictionary/.

The ALSPAC Ethics and Law Committee and the Local Research Ethics Committees gave ethical approval. A list of the Research Ethics Committee approval references for each of the visits can be found at http://www.bristol.ac.uk/media-library/sites/alspac/documents/governance/Research%20Ethics%20Committee%20approval%20references.pdf. All participants and their parents/guardians provided written informed consent.

Body weight and composition

From age 7 to 15 years, weight and height were measured at annual clinic visits. Standing height was measured to 0.1 cm using the Harpenden Stadiometer (Holtain, Crymych, Pembs, UK) with shoes and socks removed. Weight was measured to 0.1 kg using the Tanita THF 300GS body fat analyser (Tanita UK Ltd, Yewsley, Middlesex, UK), with clothes largely removed. BMI was calculated by dividing weight (kg) by height (m) squared.

Body composition was measured at the clinic visits at age 9, 11, 13, and 15 years. Total lean body mass, total fat mass, and total bone mass were derived using a Lunar Prodigy DXA scanner (GE Medical Systems Lunar, Madison, WI, USA) following standardized procedures previously described (E3). We calculated a lean body mass index (LBMI) and a fat mass index (FMI) by dividing total lean body mass and total fat mass by height squared, respectively.

Lung function

Lung function was measured by spirometry at 8 and 15 years (Vitalograph 2120; Vitalograph, Maids Moreton, United Kingdom) according to American Thoracic Society standards (E4), as previously reported (E5). At 15 years, lung function was measured before and after bronchodilation with salbutamol (inhalation of a standard dose of 400 μg) (E6). All flow-volume curves were inspected post-hoc to ensure that acceptability criteria were met. Results were obtained from the best of three technically acceptable flow-volume curves repeatable within 200 mL of forced vital capacity (FVC), according to the criteria at that time. The parameters FVC, forced expiratory volume in 1 s (FEV_1), and forced expiratory flow at 25 and 75% of FVC (FEF_{25-75}) were obtained and the FEV_1/FVC ratio was calculated. The outcomes of the analysis were: post-bronchodilation lung function measures at 15 years and rate of lung function growth from age 8 to 15 years (calculated as (pre-bronchodilation lung function at 15 years – pre-bronchodilation lung function at 8 years)/time of follow-up in years).

Other variables

We collected information on sociodemographic and lifestyle factors at different time points to describe the sample or as potential confounding variables from diverse sources at different time points. At 32 weeks of gestation, the mother recorded her occupation using a self-completed questionnaire, which was used to allocate her to a social class (professional and intermediate, skilled non-manual, skilled manual, partly skilled, and unskilled manual workers) based on the 1991 Office of Population, Censuses and Surveys classifications. Smoking during pregnancy was assessed at 18 and 32 weeks of gestation using self-completed questionnaires and a dichotomous variable was created for any smoking during pregnancy. Birthweight, gestational age and sex were obtained from birth records. Information about breastfeeding was obtained at age 15 months from maternal self-completed questionnaires. Environmental tobacco exposure at age 3 years was recorded by the mother

using a self-completed questionnaire. From the 7 years questionnaire, we obtained data on total energy intake of the child based on a 3-day report. At 11 years, physical activity was measured by accelerometer (Actigraph LLC, Fort Walton Beach, FL, USA) and the wear-time spent in moderate to vigorous physical activity (MVPA) (E7) was obtained. Smoking habits at age 14 years were reported by the children themselves using a self-completed questionnaire. At 15 years, children reported if a doctor had ever diagnosed them with asthma. Finally, pubertal status (age at menarche for girls and state of voice break for boys at 15 years) was obtained from a puberty questionnaire completed by the parents or/and children from age 8 to 15 years. We used the first reported age at onset of menarche, as this report should be least affected by recall bias.

Identification of body weight and composition trajectories

We identified BMI trajectories, using data at ages 7, 8, 9, 10, 11, 12, 13 and 15 years, as well as LBMI and FMI trajectories, using data at ages 9, 11, 13 and 15 years. As the distribution of BMI and FMI was right-skewed, we applied the natural log-transformation to all body weight and composition measures prior to the identification of the trajectories. The trajectories were defined by applying a Group-Based Trajectory Modeling approach (E8, E9) using the Stata plug-in *Traj* (E10). This approach has been previously used to identify anthropometric trajectories both in children (E11- E13) and adults (E14-E16).

Group-Based Trajectory Modeling, a specialized form of finite mixture modeling, uses the trajectory groups as a statistical device for approximating the unknown distribution of trajectories across population members employing a maximum likelihood approach (E9). The detailed steps of model selection have been previously described (E17). We computed a series of models with progressively more trajectory groups (from two to ten) and determined the most appropriate number of groups based on the Bayesian Information Criterion and the proportion of participants assigned to each trajectory (*a priori* defined to contain at least 5% of the sample). We first fitted the models assuming a cubic relationship and then tested quadratic or linear relationships for any non-significant polynomial term. We selected the final models according to model fit and plausibility of the observed trajectories according to previous research on distribution of body weight and composition in children and adolescents (E18, E19). Finally, individuals were assigned to one trajectory group based on the highest estimated group-membership probability. To further assess model adequacy, we ensured that: (i) we obtained, for each trajectory, a close correspondence between the estimated probability group membership and the proportion assigned to that group based on the posterior

probability of group membership; (ii) the average of the posterior probabilities of group membership for individuals assigned to each trajectory exceeded a minimum threshold of 0.7; and (iii) the odds of correct classification based on the posterior probabilities of group membership exceeded a minimum threshold of 5 (E8, E9). The assigned trajectory was used as the exposure variable (i.e., body weight or composition trajectory) in all subsequent analyses.

Analysis of the associations between body weight and composition trajectories and post-bronchodilation lung function at 15 years

Associations of body weight and composition trajectories with post-bronchodilation lung function measures at age 15 years and lung function growth rates from age 8 to 15 years were examined using multivariable linear regression. We considered as potential confounders: (i) factors related to both the exposure and the outcome in bivariate analyses (p<0·20); (ii) factors that modified (>10% change in regression coefficient) the estimate of the exposure variable; and (iii) factors deemed relevant in the scientific literature. The final multivariable models included adjustments for maternal social class, maternal smoking during pregnancy, birth weight, any breastfeeding, pubertal status as well as age and height at 15 years. We additionally adjusted all models for lung function levels at 8 years to reduce potential reverse causality. The models for the LBMI and FMI trajectories were also mutually adjusted.

We tested multicollinearity of the models using the variance inflation factor. The p-values for the trend test were obtained by treating the body weight and composition trajectories as continuous variables.

We conducted several sensitivity analyses: (i) additionally adjusting the models by wear-time spent in MVPA at 11 years and total energy intake at 7 years in the subsample with this information available; (ii) excluding children with any lifetime history of doctor-diagnosed asthma; (iii) excluding children with spirometry measures below the first percentile ($<P_1$) or above the highest percentile ($>P_{99}$); (iv) using pre-bronchodilation lung function measures at 15 years (only for the analysis of post-bronchodilation lung function levels at 15 years), (v) not adjusting the models for lung function at 8 years and (vi) using standard deviation scores (z-scores) derived using the Global Lung Initiative equations (E20) instead of absolute lung function values.

All analyses were conducted using Stata/SE 12·0 (StataCorp, College Station, TX, USA). Results are expressed as regression coefficients with 95% confidence intervals (95% CI).
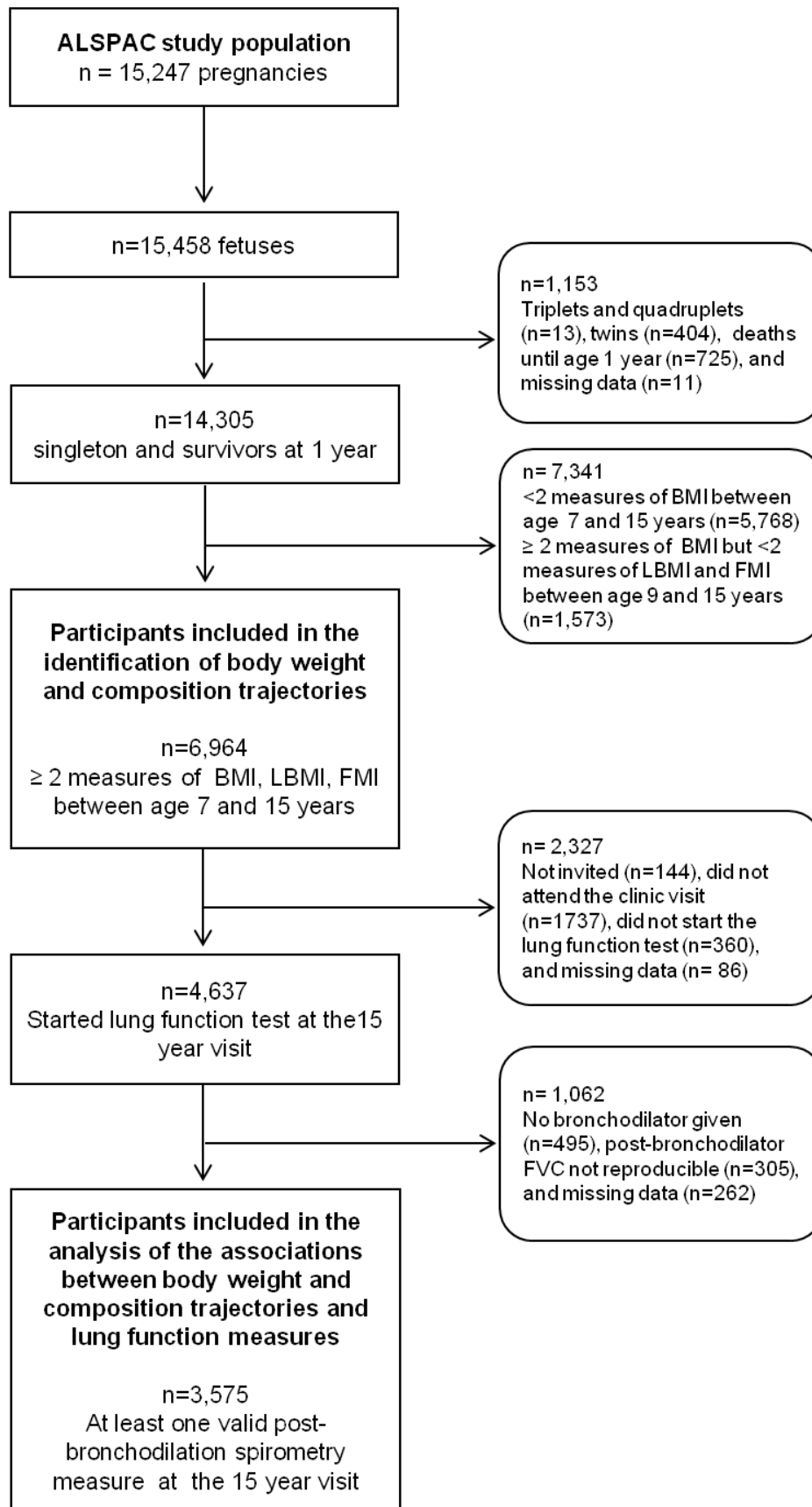
Figure E1. Flow chart of study participants

Definition of abbreviations: BMI, body mass index; FMI, fat mass index; FVC, forced vital capacity; LBMI, lean body mass index

Table E1. Characteristics of the children included and excluded from the analysis identifying the body weight and composition trajectories

Median (P_{25}-P_{75}) or n (%)	Included (n=6,964)	Excluded (n=7,341)	p-value
Mother characteristics			
Maternal social class			
Professional and intermediate	2,124 (40.1)	1,185 (29.3)	**<0.0001**
Skilled non-manual	2,214 (41.7)	1,750 (43.3)	
Skilled manual, partly, and unskilled	962 (18.2)	1,107 (27.4)	
Maternal smoking during pregnancy	1,191 (18.9)	2,276 (38.9)	**<0.0001**
Children characteristics			
Sex. Girls	3,550 (51.0)	3,425 (46.7)	**<0.0001**
Gestation (weeks)	40 (39-41)	40 (39-41)	0.185
Birth weight (Kg)	3.5 (3.1-3.8)	3.4 (3.1-3.7)	**<0.0001**
Ever breastfed	5,424 (84.6)	3,873 (68.9)	**<0.0001**
Spirometry measures at 8 years in boys			
FVC (L)	2.0 (0.3)	2.0 (0.3)	0.766
FEV_1 (L)	1.7 (0.3)	1.7 (0.3)	0.933
FEF_{25-75} (L/s)	2.0 (0.5)	2.0 (0.5)	0.536
FEV_1/FVC (%)	87.5 (6.8)	87.3 (6.7)	0.653
Spirometry measures at 8 years in girls			
FVC (L)	1.8 (0.3)	1.9 (0.4)	**0.010**
FEV_1 (L)	1.6 (0.3)	1.7 (0.3)	**0.037**
FEF_{25-75} (L/s)	2.1 (0.5)	2.1 (0.5)	0.755
FEV_1/FVC (%)	89.4 (6.1)	89.0 (6.1)	0.128
Body weight and composition at 9 years in boys			
BMI (kg/m^2)	16.8 (15.6-18.7)	16.9 (15.7-19.1)	0.212
LBMI (kg/m^2)	12.9 (12.4-13.5)	13.1 (12.5-13.7)	**0.038**
FMI (kg/m^2)	3.0 (2.1-4.7)	3.1 (2.1-5.1)	0.581
Body weight and composition at 9 years in girls			
BMI (kg/m^2)	17.3 (15.8-19.4)	17.5 (15.9-19.9)	**0.008**
LBMI (kg/m^2)	12.1 (11.5-12.7)	12.2 (11.5-12.8)	0.053
FMI (kg/m^2)	4.4 (3.1-6.2)	4.6 (3.2-6.6)	0.059

Some variables had missing values in both the included children (1,664 for maternal social class, 648 for maternal smoking during pregnancy, 338 for gestation, 421 for birthweight and 553 for ever breastfed) and excluded children (3,299 for maternal social class, 1,489 for maternal smoking during pregnancy, 354 for gestation, 442 for birthweight and 1,722 for ever breastfed)

Definition of abbreviations: P_{25}-P_{75}, 25th and 75th percentiles

p-value for the Chi-squared, Mann-Whitney, or Student's t-test

Bold: p-value <0.05

Table E2. Characteristics of the children included and excluded from the analysis examining associations of body weight and composition trajectories with post-bronchodilation lung function measures at 15 years

Median (P_{25}-P_{75}) or n (%)	Included (n=3,575)	Excluded (n=3,389)	p-value
Mother characteristics			
Maternal social class			
Professional and intermediate	1,223 (43.5)	901 (36.2)	**<0.0001**
Skilled non-manual	1,114 (39.7)	1,100 (44.2)	
Skilled manual, partly, and unskilled	473 (16.8)	489 (19.6)	
Maternal smoking during pregnancy	550 (16.8)	641 (21.1)	**<0.0001**
Children characteristics			
Sex. Girls	1,888 (52.8)	1,662 (49.0)	**0.002**
Gestation (weeks)	40 (39-41)	40 (39-41)	0.368
Birth weight (grams)	3460 (3140-3760)	3443 (3140-3760)	0.746
Ever breastfed	2,906 (87.1)	2,518 (81.9)	**<0.0001**
Spirometry measures at 8 years in boys			
FVC (L)	2.0 (0.3)	2.0 (0.3)	0.250
FEV_1 (L)	1.7 (0.3)	1.7 (0.3)	0.897
FEF_{25-75} (L/s)	2.0 (0.5)	2.1 (0.5)	0.415
FEV_1/FVC (%)	87.3 (6.8)	87.6 (6.8)	0.215
Spirometry measures at 8 years in girls			
FVC (L)	1.8 (0.3)	1.8 (0.3)	0.988
FEV_1 (L)	1.6 (0.3)	1.6 (0.3)	0.958
FEF_{25-75} (L/s)	2.1 (0.5)	2.1 (0.5)	0.833
FEV_1/FVC (%)	89.4 (6.0)	89.4 (6.1)	0.813
BMI trajectories in boys			
Normal-low	562 (32.5)	537 (31.8)	0.922
Normal-high	670 (38.8)	650 (38.5)	
Overweight	347 (20.1)	354 (21.0)	
Obese	148 (8.6)	146 (8.7)	
BMI trajectories in girls			
Normal-low	435 (26.2)	490 (26.0)	0.871
Normal-high	656 (39.5)	770 (40.8)	
Overweight	432 (26.0)	475 (25.2)	
Obese	139 (8.4)	153 (8.1)	
LBMI trajectories in boys			
Low	164 (9.5)	148 (8.8)	0.343
Medium-low	668 (38.7)	625 (37.1)	
Medium-high	685 (39.7)	678 (40.2)	
High	210 (12.2)	236 (14.0)	
LBMI trajectories in girls			
Low	229 (13.8)	234 (12.4)	0.201
Medium-low	664 (40.0)	728 (38.6)	
Medium-high	583 (35.1)	725 (38.4)	
High	186 (11.2)	201 (10.7)	
FMI trajectories in boys			
Low	416 (24.1)	406 (24.1)	0.850
Medium-low	633 (36.7)	641 (38.0)	
Medium-high	452 (26.2)	427 (25.3)	
High	226 (13.1)	213 (12.6)	
FMI trajectories in girls			
Low	265 (15.9)	288 (15.3)	0.369
Medium-low	564 (33.9)	664 (35.2)	
Medium-high	536 (32.3)	634 (33.6)	
High	297 (17.9)	302 (16.0)	

Some variables had missing values in both the included children (765 for maternal social class, 297 for maternal smoking during pregnancy, 150 for gestation, 194 for birthweight and 240 for ever breastfed) and excluded children (899 for maternal social class, 351 for maternal smoking during pregnancy, 188 for gestation, 227 for birthweight and 313 for ever breastfed)

Definition of abbreviations: BMI, body mass index; FMI, fat mass index; LBMI, lean body mass index; P_{25}-P_{75}, 25th and 75th percentiles
p-value for the Chi-squared, Mann-Whitney, or Student's t-test
Bold: p-value <0.05

Table E3. Distribution of BMI according to BMI trajectory

BMI (Kg/m²) Median (P₂₅-P₇₅)	Boys					Girls				
	Normal-low n= 1,099 (32.2%)	Normal-high n= 1,320 (38.7%)	Overweight n=701 (20.5%)	Obese n= 294 (8.6%)	*p-value*	Normal-low n= 925 (26.0%)	Normal-high n= 1,426 (40.2%)	Overweight n=907 (25.6%)	Obese n= 292 (8.2%)	*p-value*
7 years	14.6 (14.1-15.1)	15.8 (15.4-16.4)	17.2 (16.4-18.0)	20.1 (18.7-21.5)	**0.0001**	14.4 (13.9-14.9)	15.8 (15.2-16.4)	17.5 (16.7-18.4)	20.8 (19.4-22.4)	**0.0001**
8 years	15.1 (14.7-15.6)	16.6 (16.1-17.1)	18.3 (17.6-19.3)	22.0 (20.6-23.4)	**0.0001**	14.9 (14.4-15.4)	16.6 (16.0-17.2)	18.9 (18.1-19.8)	22.6 (21.5-24.2)	**0.0001**
9 years	15.2 (14.6-15.7)	16.9 (16.4-17.5)	19.4 (18.5-20.4)	23.4 (22.2-25.0)	**0.0001**	15.0 (14.4-15.5)	17.0 (16.3-17.8)	19.9 (18.9-21.1)	24.0 (22.7-25.7)	**0.0001**
10 years	15.4 (14.9-15.9)	17.4 (16.8-18.1)	20.3 (19.4-21.4)	24.4 (23.2-26.1)	**0.0001**	15.2 (14.7-15.8)	17.4 (16.7-18.3)	20.7 (19.6-21.7)	25.1 (23.7-26.7)	**0.0001**
11 years	15.9 (15.3-16.5)	18.1 (17.5-19.0)	21.4 (20.4-22.4)	25.9 (24.7-27.7)	**0.0001**	15.8 (15.1-16.4)	18.3 (17.5-19.2)	21.8 (20.7-23.1)	26.6 (25.2-28.4)	**0.0001**
12 years	16.5 (15.8-17.1)	18.8 (18.1-19.8)	22.0 (20.9-23.3)	26.7 (25.1-28.6)	**0.0001**	16.6 (15.8-17.3)	19.2 (18.3-20.2)	22.6 (21.5-23.9)	27.6 (26.2-29.4)	**0.0001**
13 years	17.1 (16.4-17.8)	19.4 (18.6-20.2)	22.4 (21.3-23.8)	27.1 (25.4-29.2)	**0.0001**	17.3 (16.5-18.1)	19.8 (19-20.8)	23.2 (21.9-24.5)	28.2 (26.6-30.3)	**0.0001**
15 years	18.3 (17.5-19.0)	20.5 (19.6-21.4)	23.2 (22.0-24.7)	27.7 (25.5-30.3)	**0.0001**	18.4 (17.5-19.4)	20.9 (20.0-22.0)	23.9 (22.5-25.5)	29.4 (27.0-31.7)	**0.0001**

Definition of abbreviations: BMI, body mass index; P₂₅-P₇₅, 25th and 75th percentiles
p-value for the Kruskal-Wallis test
Bold: p-value <0.05

Table E4. Distribution of LBMI according to LBMI trajectory

LBMI (Kg/m²) Median (P_{25}-P_{75})	Boys					Girls				
	Low n=442 (9.1%)	Medium-low n=1390 (37.9%)	Medium-high n=1228 (39.9%)	High n=354 (13.1%)	p-value	Low n=660 (13.0%)	Medium-low n=1,507 (39.2%)	Medium-high n=1,096 (36.9%)	High n=287 (10.9%)	p-value
9 years	11.8 (11.4-12.0)	12.5 (12.2-12.9)	13.3 (12.9-13.7)	14.2 (13.8-14.7)	**0.0001**	10.9 (10.7-11.2)	11.7 (11.4-12.0)	12.5 (12.2-12.8)	13.6 (13.2-14.0)	**0.0001**
11 years	11.8 (11.4-12.1)	12.7 (12.4-13.1)	13.7 (13.4-14.1)	14.9 (14.6-15.5)	**0.0001**	11.2 (10.8-11.4)	12.2 (11.8-12.5)	13.3 (12.9-13.7)	14.6 (14.2-15.1)	**0.0001**
13 years	12.5 (12.2-13.0)	14.0 (13.5-14.5)	15.6 (15.0-16.1)	17.3 (16.8-17.8)	**0.0001**	11.9 (11.6-12.1)	12.9 (12.6-13.2)	13.9 (13.6-14.4)	15.2 (14.8-15.7)	**0.0001**
15 years	13.9 (13.3-14.4)	15.4 (15-15.9)	16.9 (16.4-17.4)	18.5 (18.1-19.0)	**0.0001**	12.1 (11.8-12.4)	13.1 (12.8-13.5)	14.2 (13.8-14.6)	15.5 (14.9-16.0)	**0.0001**

Definition of abbreviations: LBMI, lean body mass index; P_{25}-P_{75}, 25th and 75th percentiles
p-value for the Kruskal-Wallis test
Bold: p-value <0.05

Table E5. Distribution of FMI according to FMI trajectory

FMI (Kg/m²) Median (P$_{25}$-P$_{75}$)	Boys					Girls				
	Low n=822 (24.1%)	Medium-low n=1,274 (37.3%)	Medium-high n=879 (25.7%)	High n=439 (12.9%)	p-value	Low n=553 (15.6%)	Medium-low n=1,228 (34.6%)	Medium-high n=1,170 (32.9%)	High n=599 (16.9%)	p-value
9 years	1.7 (1.4-2.0)	2.7 (2.3-3.2)	4.5 (3.7-5.4)	7.7 (6.5-9.3)	0.0001	2.3 (2.0-2.6)	3.5 (3.1-4.1)	5.4 (4.7-6.2)	8.5 (7.3-9.8)	0.0001
11 years	2.0 (1.7-2.3)	3.4 (2.9-4.0)	5.8 (4.9-6.9)	9.5 (8.1-11.0)	0.0001	2.6 (2.3-3.0)	4.0 (3.5-4.5)	6.2 (5.4-7.2)	9.8 (8.7-11.1)	0.0001
13 years	1.7 (1.4-2.0)	2.8 (2.3-3.3)	5.2 (4.2-6.2)	9.3 (8.0-11.0)	0.0001	3.1 (2.7-3.5)	4.7 (4.1-5.3)	7.0 (6.1-7.8)	10.5 (9.3-12.3)	0.0001
15 years	1.6 (1.3-1.8)	2.5 (2.1-3.0)	4.4 (3.6-5.7)	8.9 (7.3-11.0)	0.0001	3.8 (3.2-4.4)	5.5 (4.8-6.2)	7.5 (6.7-8.5)	11.4 (10.0-13.6)	0.0001

Definition of abbreviations: FMI, fat mass index; P$_{25}$-P$_{75}$, 25th and 75th percentiles
p-value for the Kruskal-Wallis test
Bold: p-value <0.05

Table E6. Adjusted associations of body weight and composition trajectories with post-bronchodilation lung function measures at age 15 years

		FVC (L)		FEV$_1$ (L)		FEF$_{25-75}$ (L/s)		FEV$_1$/FVC (%)	
		Adjusted β [95% CI]	p-value	Adjusted β [95% CI]	p-value	Adjusted β [95% CI]	p-value	Adjusted β [95% CI]	p-value
BOYS									
BMI	Normal-low	(Reference)		(Reference)		(Reference)		(Reference)	
	Normal-high	0.11 [0.02; 0.21]	**0.017**	0.11 [0.03; 0.2]	**0.008**	0.16 [0.03; 0.30]	**0.019**	-0.05 [-0.89; 0.79]	0.910
	Overweight	0.15 [0.04; 0.27]	**0.007**	0.12 [0.02; 0.22]	**0.018**	0.14 [-0.03; 0.30]	0.099	-0.84 [-1.83; 0.16]	0.100
	Obese	0.11 [-0.05; 0.27]	0.161	0.01 [-0.13; 0.15]	0.854	-0.13 [-0.36; 0.10]	0.261	-1.82 [-3.22; -0.42]	**0.011**
		p-trend	**0.014**	p-trend	0.165	p-trend	0.890	p-trend	**0.007**
LBMI	Low	(Reference)		(Reference)		(Reference)		(Reference)	
	Medium-low	0.24 [0.09; 0.39]	**0.001**	0.22 [0.08; 0.35]	**0.002**	0.24 [0.01; 0.46]	**0.039**	-0.46 [-1.86; 0.94]	0.516
	Medium-high	0.44 [0.29; 0.59]	**<0.0001**	0.40 [0.26; 0.54]	**<0.0001**	0.43 [0.21; 0.66]	**<0.0001**	-0.42 [-1.83; 0.99]	0.560
	High	0.62 [0.44; 0.79]	**<0.0001**	0.53 [0.38; 0.69]	**<0.0001**	0.53 [0.27; 0.80]	**<0.0001**	-0.79 [-2.42; 0.83]	0.339
		p-trend	**<0.0001**	p-trend	**<0.0001**	p-trend	**<0.0001**	p-trend	0.408
FMI	Low	(Reference)		(Reference)		(Reference)		(Reference)	
	Medium-low	0.04 [-0.06; 0.13]	0.440	0.07 [-0.01; 0.16]	0.102	0.18 [0.04; 0.32]	**0.014**	0.77 [-0.12; 1.66]	0.089
	Medium-high	0.02 [-0.09; 0.12]	0.743	-0.01 [-0.11; 0.09]	0.854	-0.03 [-0.19; 0.13]	0.710	-0.80 [-1.79; 0.19]	0.111
	High	-0.09 [-0.22; 0.05]	0.210	-0.14 [-0.26; -0.01]	**0.032**	-0.20 [-0.4; 0.01]	0.059	-1.44 [-2.70; -0.18]	**0.025**
		p-trend	0.355	p-trend	**0.035**	p-trend	**0.028**	p-trend	**0.003**
GIRLS									
BMI	Normal-low	(Reference)		(Reference)		(Reference)		(Reference)	
	Normal-high	0.08 [0.01; 0.16]	**0.026**	0.06 [-0.01; 0.13]	0.107	0.11 [-0.02; 0.24]	0.098	-0.84 [-1.78; 0.10]	0.080
	Overweight	0.12 [0.03; 0.21]	**0.007**	0.08 [-0.01; 0.17]	0.071	0.09 [-0.07; 0.24]	0.277	-1.60 [-2.70; -0.50]	**0.004**
	Obese	0.22 [0.09; 0.35]	**0.001**	0.12 [0.00; 0.25]	0.060	0.08 [-0.15; 0.31]	0.488	-2.85 [-4.47; -1.23]	**0.001**
		p-trend	**<0.0001**	p-trend	**0.033**	p-trend	0.349	p-trend	**<0.0001**
LBMI	Low	(Reference)		(Reference)		(Reference)		(Reference)	
	Medium-low	0.17 [0.08; 0.27]	**<0.0001**	0.18 [0.09; 0.28]	**<0.0001**	0.29 [0.12; 0.46]	**0.001**	0.53 [-0.68; 1.75]	0.388
	Medium-high	0.28 [0.18; 0.38]	**<0.0001**	0.28 [0.18; 0.38]	**<0.0001**	0.38 [0.2; 0.55]	**<0.0001**	0.09 [-1.16; 1.34]	0.884
	High	0.37 [0.23; 0.50]	**<0.0001**	0.30 [0.17; 0.43]	**<0.0001**	0.35 [0.12; 0.58]	**0.003**	-1.13 [-2.76; 0.51]	0.176
		p-trend	**<0.0001**	p-trend	**<0.0001**	p-trend	**0.001**	p-trend	0.140
FMI	Low	(Reference)		(Reference)		(Reference)		(Reference)	
	Medium-low	0.02 [-0.07; 0.11]	0.704	0.01 [-0.08; 0.09]	0.898	0.10 [-0.06; 0.26]	0.218	-0.68 [-1.81; 0.45]	0.236
	Medium-high	0.03 [-0.06; 0.12]	0.525	0.00 [-0.09; 0.09]	0.934	0.03 [-0.13; 0.19]	0.730	-1.25 [-2.41; -0.08]	**0.036**
	High	0.09 [-0.03; 0.20]	0.141	0.02 [-0.09; 0.13]	0.718	0.03 [-0.18; 0.23]	0.793	-2.05 [-3.49; -0.6]	**0.005**
		p-trend	0.189	p-trend	0.921	p-trend	0.684	p-trend	**0.002**

Definition of abbreviations: BMI, body mass index; FEF$_{25-75}$ forced expiratory flow at 25-75%; FEV$_1$, volume expired in the first second; FMI, fat mass index; FVC, forced vital capacity; LBMI, lean body mass index; 95% CI, 95% confidence intervals; β, estimate of regression coefficient. Models are adjusted for maternal social class, maternal smoking during pregnancy, birth weight, breastfeeding, lung function measures at 8 years, pubertal status (age at menarche for girls and voice break status at age 15 years for boys), as well as age and height at 15 years. Models for FMI and LBMI are also mutually adjusted. Bold: p-value <0.05

Table E7. Adjusted associations of body weight and composition trajectories with pre-bronchodilation lung function growth rates from age 8 to 15 years

		FVC change (mL/year)		FEV$_1$ change (mL/year)		FEF$_{25-75}$ change (mL/s·year)	
		Adjusted β [95% CI]	p-value	Adjusted β [95% CI]	p-value	Adjusted β [95% CI]	p-value
BOYS							
BMI	Normal-low	(Reference)		(Reference)		(Reference)	
	Normal-high	23.3 [9.7; 36.8]	**0.001**	21.5 [9.6; 33.4]	**<0.0001**	24.1 [5.2; 43.0]	**0.012**
	Overweight	27.4 [11.2; 43.5]	**0.001**	20.3 [6.1; 34.5]	**0.005**	18.5 [-3.9; 40.9]	0.105
	Obese	15.2 [-7.8; 38.1]	0.195	-0.6 [-20.6; 19.3]	0.952	-14.8 [-46.5; 16.9]	0.360
		p-trend	**0.007**	p-trend	0.148	p-trend	0.802
LBMI	Low	(Reference)		(Reference)		(Reference)	
	Medium-low	33.3 [11.8; 54.8]	**0.002**	30.3 [11.2; 49.4]	**0.002**	31.2 [0.5; 62.0]	**0.047**
	Medium-high	67.2 [45.6; 88.9]	**<0.0001**	58.7 [39.4; 77.9]	**<0.0001**	54.0 [23.1; 84.9]	**0.001**
	High	90.3 [65.0; 115.7]	**<0.0001**	75.6 [53.2; 98.0]	**<0.0001**	68.3 [32.3; 104.4]	**<0.0001**
		p-trend	**<0.0001**	p-trend	**<0.0001**	p-trend	**<0.0001**
FMI	Low	(Reference)		(Reference)		(Reference)	
	Medium-low	7.2 [-6.7; 21.1]	0.310	9.8 [-2.4; 22.1]	0.114	19.8 [-0.1; 39.7]	0.051
	Medium-high	4.2 [-11.3; 19.6]	0.597	-1.5 [-15.1; 12.1]	0.828	-5.0 [-27.0; 17.1]	0.659
	High	-14.6 [-34.5; 5.3]	0.151	-23.2 [-40.7; -5.8]	**0.009**	-25.0 [-53.3; 3.3]	0.084
		p-trend	0.315	p-trend	**0.015**	p-trend	**0.045**
GIRLS							
BMI	Normal-low	(Reference)		(Reference)		(Reference)	
	Normal-high	7.6 [-2.9; 18.1]	0.155	4.0 [-5.8; 13.8]	0.426	-0.4 [-17.4; 16.5]	0.960
	Overweight	17.3 [4.9; 29.7]	**0.006**	7.8 [-3.8; 19.3]	0.186	-2.3 [-22.2; 17.5]	0.818
	Obese	28.0 [9.4; 46.6]	**0.003**	8.8 [-8.4; 26.0]	0.315	-4.7 [-34.4; 25.0]	0.756
		p-trend	**0.001**	p-trend	0.165	p-trend	0.734
LBMI	Low	(Reference)		(Reference)		(Reference)	
	Medium-low	25.9 [12.6; 39.2]	**<0.0001**	23.6 [11; 36.2]	**<0.0001**	31.2 [9.3; 53.1]	**0.005**
	Medium-high	43.0 [28.9; 57.0]	**<0.0001**	35.7 [22.5; 48.9]	**<0.0001**	37.8 [15.1; 60.5]	**0.001**
	High	55.8 [37.1; 74.5]	**<0.0001**	41.9 [24.3; 59.4]	**<0.0001**	47.5 [17.2; 77.8]	**0.002**
		p-trend	**<0.0001**	p-trend	**<0.0001**	p-trend	**0.002**
FMI	Low	(Reference)		(Reference)		(Reference)	
	Medium-low	-2.8 [-15.1; 9.5]	0.655	-3.3 [-14.9; 8.2]	0.574	-3.8 [-24.1; 16.5]	0.716
	Medium-high	0.3 [-12.5; 13.2]	0.959	-3.5 [-15.5; 8.5]	0.563	-9.7 [-30.8; 11.5]	0.370
	High	4.9 [-11.1; 20.8]	0.550	-5.7 [-20.5; 9.2]	0.456	-17.7 [-43.9; 8.6]	0.187
		p-trend	0.516	p-trend	0.403	p-trend	0.117

Rate of lung function growth for each parameter was calculated as: (pre-bronchodilation lung function measure at 15 years - pre-bronchodilation lung function measure at 8 years)/time follow-up. Definition of abbreviations: BMI, body mass index; FEF$_{25-75}$ forced expiratory flow at 25-75%; FEV$_1$, volume expired in the first second; FMI, fat mass index; FVC, forced vital capacity; LBMI, lean body mass index; 95% CI, 95% confidence intervals; β, estimate of regression coefficient. Models are adjusted for maternal social class, maternal smoking during pregnancy, birth weight, breastfeeding, lung function measures at 8 years, pubertal status (age at menarche for girls and voice break status at age 15 years for boys), as well as age and height at 15 years. Models for FMI and LBMI are also mutually adjusted. Bold: p-value <0.05

Table E8. Adjusted associations of body weight and composition trajectories with post-bronchodilation lung function measures at age 15 years: Models additionally adjusted for wear-time spent in MVPA and total energy intake

		FVC (L)		FEV_1 (L)		FEF_{25-75} (L/s)		FEV_1/FVC (%)	
		Adjusted β [95% CI]	p-value	Adjusted β [95% CI]	p-value	Adjusted β [95% CI]	p-value	Adjusted β [95% CI]	p-value
BOYS									
BMI	Normal-low	(Reference)		(Reference)		(Reference)		(Reference)	
	Normal-high	0.17 [0.06; 0.27]	**0.003**	0.15 [0.05; 0.25]	**0.003**	0.20 [0.04; 0.36]	**0.015**	-0.17 [-1.14; 0.81]	0.733
	Overweight	0.21 [0.07; 0.34]	**0.002**	0.16 [0.04; 0.28]	**0.011**	0.17 [-0.03; 0.36]	**0.092**	-0.69 [-1.87; 0.50]	0.257
	Obese	0.19 [-0.01; 0.39]	0.067	0.09 [-0.09; 0.27]	0.334	-0.05 [-0.34; 0.24]	0.738	-1.44 [-3.23; 0.34]	0.112
		p-trend	**0.003**	p-trend	**0.035**	p-trend	0.421	p-trend	0.09
LBMI	Low	(Reference)		(Reference)		(Reference)		(Reference)	
	Medium-low	0.28 [0.11; 0.45]	**0.001**	0.25 [0.10; 0.41]	**0.002**	0.26 [0.00; 0.51]	**0.046**	-0.19 [-1.79; 1.41]	0.817
	Medium-high	0.47 [0.3; 0.64]	**<0.0001**	0.43 [0.28; 0.59]	**<0.0001**	0.46 [0.20; 0.71]	**<0.0001**	-0.02 [-1.62; 1.59]	0.984
	High	0.65 [0.45; 0.85]	**<0.0001**	0.56 [0.38; 0.74]	**<0.0001**	0.55 [0.26; 0.85]	**<0.0001**	-0.58 [-2.42; 1.27]	0.539
		p-trend	**<0.0001**	p-trend	**<0.0001**	p-trend	**<0.0001**	p-trend	0.728
FMI	Low	(Reference)		(Reference)		(Reference)		(Reference)	
	Medium-low	0.04 [-0.07; 0.15]	0.452	0.07 [-0.03; 0.18]	0.155	0.18 [0.01; 0.35]	**0.035**	0.68 [-0.36; 1.72]	0.198
	Medium-high	0.05 [-0.08; 0.18]	0.436	0.01 [-0.11; 0.13]	0.859	-0.01 [-0.20; 0.18]	0.945	-0.84 [-2.02; 0.34]	0.162
	High	-0.02 [-0.19; 0.15]	0.805	-0.08 [-0.24; 0.07]	0.304	-0.15 [-0.41; 0.10]	0.246	-1.32 [-2.89; 0.25]	0.099
		p-trend	0.903	p-trend	0.342	p-trend	0.198	p-trend	**0.025**
GIRLS									
BMI	Normal-low	(Reference)		(Reference)		(Reference)		(Reference)	
	Normal-high	0.07 [-0.02; 0.15]	0.127	0.04 [-0.04; 0.13]	0.308	0.07 [-0.08; 0.23]	0.357	-0.85 [-1.92; 0.23]	0.123
	Overweight	0.11 [0.01; 0.22]	**0.032**	0.07 [-0.03; 0.17]	0.193	0.07 [-0.11; 0.25]	0.462	-1.67 [-2.93; -0.41]	**0.009**
	Obese	0.18 [0.03; 0.34]	**0.020**	0.10 [-0.05; 0.25]	0.211	0.06 [-0.21; 0.33]	0.660	-2.56 [-4.43; -0.69]	**0.007**
		p-trend	**0.008**	p-trend	0.134	p-trend	0.523	p-trend	**0.001**
LBMI	Low	(Reference)		(Reference)		(Reference)		(Reference)	
	Medium-low	0.19 [0.08; 0.30]	**0.001**	0.21 [0.10; 0.32]	**<0.0001**	0.34 [0.14; 0.54]	**0.001**	0.61 [-0.77; 2.00]	0.384
	Medium-high	0.31 [0.19; 0.42]	**<0.0001**	0.30 [0.19; 0.41]	**<0.0001**	0.44 [0.23; 0.64]	**<0.0001**	0.04 [-1.39; 1.46]	0.960
	High	0.36 [0.21; 0.52]	**<0.0001**	0.29 [0.14; 0.44]	**<0.0001**	0.34 [0.06; 0.61]	**0.015**	-1.4 [-3.27; 0.47]	0.142
		p-trend	**<0.0001**	p-trend	**<0.0001**	p-trend	**0.004**	p-trend	0.092
FMI	Low	(Reference)		(Reference)		[Reference]		(Reference)	
	Medium-low	0.03 [-0.07; 0.14]	0.501	0.03 [-0.07; 0.13]	0.525	0.12 [-0.06; 0.30]	0.191	-0.44 [-1.72; 0.84]	0.496
	Medium-high	0.02 [-0.09; 0.13]	0.696	0.00 [-0.10; 0.11]	0.931	0.01 [-0.19; 0.20]	0.959	-1.05 [-2.38; 0.28]	0.122
	High	0.09 [-0.04; 0.23]	0.185	0.04 [-0.09; 0.17]	0.535	0.04 [-0.20; 0.28]	0.730	-1.53 [-3.21; 0.15]	0.074
		p-trend	0.392	p-trend	0.970	p-trend	0.561	p-trend	**0.026**

Definition of abbreviations: BMI, body mass index; FEF_{25-75} forced expiratory flow at 25-75%; FEV_1, volume expired in the first second; FMI, fat mass index; FVC, forced vital capacity; LBMI, lean body mass index; 95% CI, 95% confidence intervals; β, estimate of regression coefficient. Models are adjusted for maternal social class, maternal smoking during pregnancy, birth weight, breastfeeding, total energy intake at 7 years, lung function measures at 8 years, wear-time spent in MVPA at 11 years, pubertal status (age at menarche for girls and voice break status at age 15 years for boys), as well as age and height at 15 years. Models for FMI and LBMI are also mutually adjusted. Bold: p-value <0.05

Table E9. Adjusted associations of body weight and composition trajectories with post-bronchodilation lung function measures at age 15 years: Excluding children with lifetime doctor-diagnosed asthma (n=865)

		FVC (L)		FEV$_1$ (L)		FEF$_{25-75}$ (L/s)		FEV$_1$/FVC (%)	
		Adjusted β [95% CI]	p-value	Adjusted β [95% CI]	p-value	Adjusted β [95% CI]	p-value	Adjusted β [95% CI]	p-value
BOYS									
BMI	Normal-low	(Reference)		(Reference)		(Reference)		(Reference)	
	Normal-high	0.15 [0.04; 0.26]	**0.009**	0.13 [0.03; 0.23]	**0.011**	0.18 [0.01; 0.34]	**0.037**	-0.28 [-1.23; 0.68]	0.572
	Overweight	0.17 [0.04; 0.31]	**0.009**	0.14 [0.01; 0.26]	**0.029**	0.19 [-0.01; 0.38]	0.059	-0.99 [-2.12; 0.15]	0.089
	Obese	0.07 [-0.12; 0.27]	0.447	-0.06 [-0.23; 0.12]	0.512	-0.22 [-0.5; 0.06]	0.130	-2.55 [-4.2; -0.90]	**0.002**
	p-trend		0.052		0.453		0.942		**0.003**
LBMI	Low	(Reference)		(Reference)		(Reference)		(Reference)	
	Medium-low	0.24 [0.06; 0.43]	**0.009**	0.19 [0.02; 0.36]	**0.027**	0.17 [-0.11; 0.45]	0.232	-1.05 [-2.71; 0.60]	0.213
	Medium-high	0.48 [0.3; 0.67]	**<0.0001**	0.42 [0.24; 0.59]	**<0.0001**	0.41 [0.13; 0.69]	**0.004**	-0.85 [-2.52; 0.81]	0.314
	High	0.66 [0.44; 0.88]	**<0.0001**	0.51 [0.31; 0.72]	**<0.0001**	0.44 [0.1; 0.77]	**0.010**	-1.98 [-3.92; -0.03]	**0.046**
	p-trend		**<0.0001**		**<0.0001**		**<0.0001**		0.140
FMI	Low	(Reference)		(Reference)		(Reference)		(Reference)	
	Medium-low	0.03 [-0.09; 0.14]	0.637	0.07 [-0.04; 0.17]	0.202	0.21 [0.04; 0.39]	**0.015**	0.93 [-0.08; 1.93]	0.072
	Medium-high	0.01 [-0.11; 0.14]	0.844	0.00 [-0.11; 0.12]	0.961	0.06 [-0.13; 0.26]	0.510	-0.47 [-1.60; 0.65]	0.409
	High	-0.12 [-0.29; 0.04]	0.134	-0.18 [-0.33; -0.04]	**0.015**	-0.24 [-0.48; 0.01]	0.061	-1.75 [-3.19; -0.32]	**0.017**
	p-trend		0.269		**0.038**		0.117		**0.008**
GIRLS									
BMI	Normal-low	(Reference)		(Reference)		(Reference)		(Reference)	
	Normal-high	0.09 [0.00; 0.17]	**0.042**	0.05 [-0.03; 0.13]	0.254	0.12 [-0.03; 0.27]	0.117	-0.98 [-2.04; 0.08]	0.071
	Overweight	0.13 [0.03; 0.23]	**0.014**	0.08 [-0.02; 0.18]	0.132	0.06 [-0.11; 0.24]	0.487	-1.94 [-3.21; -0.67]	**0.003**
	Obese	0.26 [0.09; 0.42]	**0.002**	0.18 [0.02; 0.34]	**0.028**	0.18 [-0.11; 0.47]	0.227	-2.68 [-4.72; -0.65]	**0.010**
	p-trend		**0.001**		**0.028**		0.279		**0.001**
LBMI	Low	(Reference)		(Reference)		(Reference)		(Reference)	
	Medium-low	0.21 [0.10; 0.31]	**<0.0001**	0.21 [0.10; 0.31]	**<0.0001**	0.29 [0.10; 0.48]	**0.003**	0.42 [-0.94; 1.79]	0.542
	Medium-high	0.28 [0.17; 0.39]	**<0.0001**	0.28 [0.17; 0.39]	**<0.0001**	0.40 [0.21; 0.60]	**<0.0001**	0.22 [-1.20; 1.63]	0.764
	High	0.40 [0.25; 0.56]	**<0.0001**	0.34 [0.19; 0.49]	**<0.0001**	0.41 [0.14; 0.68]	**0.003**	-1.14 [-3.06; 0.79]	0.248
	p-trend		**<0.0001**		**<0.0001**		**<0.0001**		0.349
FMI	Low	(Reference)		(Reference)		(Reference)		(Reference)	
	Medium-low	0.01 [-0.09; 0.11]	0.807	-0.02 [-0.12; 0.08]	0.707	0.08 [-0.10; 0.25]	0.401	-0.96 [-2.24; 0.32]	0.140
	Medium-high	0.03 [-0.07; 0.14]	0.547	-0.02 [-0.12; 0.09]	0.770	-0.01 [-0.19; 0.17]	0.913	-1.82 [-3.14; -0.50]	**0.007**
	High	0.11 [-0.03; 0.24]	0.112	0.04 [-0.09; 0.17]	0.531	0.00 [-0.24; 0.24]	0.979	-2.31 [-4.01; -0.60]	**0.008**
	p-trend		0.139		0.679		0.534		**0.001**

Definition of abbreviations: BMI, body mass index; FEF$_{25-75}$ forced expiratory flow at 25-75%; FEV$_1$, volume expired in the first second; FMI, fat mass index; FVC, forced vital capacity; LBMI, lean body mass index; 95% CI, 95% confidence intervals; β, estimate of regression coefficient. Models are adjusted for maternal social class, maternal smoking during pregnancy, birth weight, breastfeeding, lung function measures at 8 years, pubertal status (age at menarche for girls and voice break status at age 15 years for boys), as well as age and height at 15 years. Models for FMI and LBMI are also mutually adjusted. Bold: p-value <0.05

Table E10. Adjusted associations of body weight and composition trajectories with post-bronchodilation lung function measures at age 15 years: Excluding children with extreme lung function measures (<p1 and p>99) at age 15 years

		FVC (L)		FEV$_1$ (L)		FEF$_{25-75}$ (L/s)		FEV$_1$/FVC (%)	
		Adjusted β [95% CI]	p-value	Adjusted β [95% CI]	p-value	Adjusted β [95% CI]	p-value	Adjusted β [95% CI]	p-value
BOYS									
BMI	Normal-low	(Reference)		(Reference)		(Reference)		(Reference)	
	Normal-high	0.11 [0.03; 0.20]	**0.010**	0.10 [0.02; 0.18]	**0.014**	0.15 [0.02; 0.28]	**0.020**	-0.01 [-0.80; 0.79]	0.987
	Overweight	0.19 [0.09; 0.29]	**<0.0001**	0.15 [0.05; 0.24]	**0.002**	0.09 [-0.07; 0.24]	0.263	-0.82 [-1.76; 0.13]	0.091
	Obese	0.15 [0.00; 0.30]	**0.044**	0.03 [-0.1; 0.16]	0.618	-0.12 [-0.33; 0.10]	0.291	-1.94 [-3.28; -0.6]	**0.005**
	p-trend	**0.001**		*p-trend*	**0.042**	*p-trend*	0.894	*p-trend*	**0.004**
LBMI	Low	(Reference)		(Reference)		(Reference)		(Reference)	
	Medium-low	0.22 [0.08; 0.36]	**0.002**	0.20 [0.07; 0.32]	**0.003**	0.22 [0.02; 0.43]	**0.036**	-0.47 [-1.78; 0.84]	0.484
	Medium-high	0.44 [0.30; 0.58]	**<0.0001**	0.40 [0.27; 0.53]	**<0.0001**	0.46 [0.25; 0.67]	**<0.0001**	-0.47 [-1.79; 0.85]	0.486
	High	0.57 [0.40; 0.73]	**<0.0001**	0.50 [0.35; 0.65]	**<0.0001**	0.49 [0.25; 0.74]	**<0.0001**	-0.74 [-2.27; 0.80]	0.345
	p-trend	**<0.0001**		*p-trend*	**<0.0001**	*p-trend*	**<0.0001**	*p-trend*	0.418
FMI	Low	(Reference)		(Reference)		(Reference)		(Reference)	
	Medium-low	0.02 [-0.07; 0.11]	0.681	0.05 [-0.03; 0.13]	0.228	0.13 [0.00; 0.27]	0.050	0.73 [-0.11; 1.57]	0.089
	Medium-high	0.05 [-0.05; 0.15]	0.334	0.01 [-0.08; 0.10]	0.823	-0.06 [-0.20; 0.09]	0.471	-0.79 [-1.73; 0.14]	0.097
	High	-0.01 [-0.14; 0.11]	0.820	-0.10 [-0.22; 0.01]	0.076	-0.23 [-0.42; -0.04]	**0.018**	-1.37 [-2.57; -0.17]	**0.025**
	p-trend	0.791		*p-trend*	0.131	*p-trend*	**0.008**	*p-trend*	**0.003**
GIRLS									
BMI	Normal-low	(Reference)		(Reference)		(Reference)		(Reference)	
	Normal-high	0.07 [0.01; 0.14]	**0.035**	0.05 [-0.01; 0.12]	0.129	0.15 [0.03; 0.28]	**0.016**	-0.96 [-1.81; -0.11]	**0.027**
	Overweight	0.12 [0.04; 0.20]	**0.003**	0.07 [-0.01; 0.15]	0.078	0.09 [-0.06; 0.23]	0.243	-1.95 [-2.94; -0.96]	**<0.0001**
	Obese	0.19 [0.07; 0.31]	**0.002**	0.11 [-0.01; 0.22]	0.075	0.04 [-0.18; 0.27]	0.695	-2.66 [-4.10; -1.22]	**<0.0001**
	p-trend	**<0.0001**		*p-trend*	**0.039**	*p-trend*	0.468	*p-trend*	
LBMI	Low	(Reference)		(Reference)		(Reference)		(Reference)	
	Medium-low	0.14 [0.05; 0.23]	**0.002**	0.13 [0.05; 0.22]	**0.002**	0.24 [0.08; 0.41]	**0.003**	0.39 [-0.71; 1.49]	0.489
	Medium-high	0.26 [0.16; 0.35]	**<0.0001**	0.23 [0.14; 0.32]	**<0.0001**	0.34 [0.17; 0.50]	**<0.0001**	-0.17 [-1.31; 0.96]	0.764
	High	0.27 [0.15; 0.39]	**<0.0001**	0.21 [0.10; 0.33]	**<0.0001**	0.32 [0.09; 0.54]	**0.006**	-1.44 [-2.94; 0.07]	0.061
	p-trend	**<0.0001**		*p-trend*	**<0.0001**	*p-trend*	**0.002**	*p-trend*	**0.032**
FMI	Low	(Reference)		(Reference)		(Reference)		(Reference)	
	Medium-low	0.03 [-0.06; 0.11]	0.536	0.02 [-0.06; 0.10]	0.668	0.08 [-0.07; 0.23]	0.304	-0.89 [-1.92; 0.13]	0.088
	Medium-high	0.04 [-0.04; 0.13]	0.329	0.00 [-0.08; 0.08]	0.973	0.03 [-0.12; 0.19]	0.698	-1.55 [-2.60; -0.49]	**0.004**
	High	0.11 [0.00; 0.21]	**0.041**	0.03 [-0.07; 0.13]	0.564	-0.03 [-0.22; 0.17]	0.781	-2.18 [-3.48; -0.87]	**0.001**
	p-trend	0.067		*p-trend*	0.916	*p-trend*	0.502	*p-trend*	**<0.0001**

Definition of abbreviations: BMI, body mass index; FEF$_{25-75}$ forced expiratory flow at 25-75%; FEV$_1$, volume expired in the first second; FMI, fat mass index; FVC, forced vital capacity; LBMI, lean body mass index; 95% CI, 95% confidence intervals; β, estimate of regression coefficient. Models are adjusted for maternal social class, maternal smoking during pregnancy, birth weight, breastfeeding, lung function measures at 8 years, pubertal status (age at menarche for girls and voice break status at age 15 years for boys), as well as age and height at 15 years. Models for FMI and LBMI are also mutually adjusted. Number of observations deleted from the adjusted models: FVC (boys/girls):32/36; FEV$_1$: 32/33; FEF$_{25-75}$:32/36; ratio FEV$_1$/FVC: 60/113. Bold: p-value <0.05

Table E11. Adjusted associations of body weight and composition trajectories with pre-bronchodilation lung function measures at age 15 years

		FVC (L)		FEV$_1$ (L)		FEF$_{25-75}$ (L/s)		FEV$_1$/FVC (%)	
		Adjusted β [95% CI]	p-value	Adjusted β [95% CI]	p-value	Adjusted β [95% CI]	p-value	Adjusted β [95% CI]	p-value
BOYS									
BMI	Normal-low	(Reference)		(Reference)		(Reference)		(Reference)	
	Normal-high	0.16 [0.07; 0.25]	**0.001**	0.15 [0.07; 0.23]	**<0.0001**	0.16 [0.04; 0.29]	**0.012**	-0.16 [-1.08; 0.76]	0.735
	Overweight	0.18 [0.07; 0.29]	**0.001**	0.13 [0.04; 0.23]	**0.007**	0.11 [-0.04; 0.27]	0.143	-0.82 [-1.91; 0.27]	0.139
	Obese	0.10 [-0.05; 0.26]	0.202	-0.01 [-0.15; 0.12]	0.880	-0.11 [-0.32; 0.11]	0.322	-1.65 [-3.18; -0.11]	**0.036**
		p-trend	**0.008**	*p-trend*	0.190	*p-trend*	0.917	*p-trend*	**0.023**
LBMI	Low	(Reference)		(Reference)		(Reference)		(Reference)	
	Medium-low	0.23 [0.09; 0.38]	**0.002**	0.21 [0.08; 0.34]	**0.001**	0.23 [0.02; 0.43]	**0.035**	0.17 [-1.35; 1.69]	0.830
	Medium-high	0.47 [0.32; 0.61]	**<0.0001**	0.41 [0.28; 0.54]	**<0.0001**	0.38 [0.17; 0.59]	**<0.0001**	-0.21 [-1.74; 1.32]	0.788
	High	0.63 [0.46; 0.80]	**<0.0001**	0.53 [0.38; 0.68]	**<0.0001**	0.49 [0.24; 0.73]	**<0.0001**	-0.42 [-2.19; 1.36]	0.644
		p-trend	**<0.0001**	*p-trend*	**<0.0001**	*p-trend*	**<0.0001**	*p-trend*	0.362
FMI	Low	(Reference)		(Reference)		(Reference)		(Reference)	
	Medium-low	0.05 [-0.04; 0.15]	0.278	0.07 [-0.01; 0.15]	0.106	0.13 [0.00; 0.27]	0.057	0.22 [-0.75; 1.20]	0.653
	Medium-high	0.03 [-0.07; 0.13]	0.567	-0.01 [-0.10; 0.08]	0.821	-0.04 [-0.19; 0.11]	0.614	-1.07 [-2.15; 0.01]	0.051
	High	-0.10 [-0.24; 0.03]	0.131	-0.17 [-0.28; -0.05]	**0.006**	-0.18 [-0.38; 0.01]	0.060	-1.4 [-2.78; -0.02]	**0.047**
		p-trend	0.294	*p-trend*	**0.010**	*p-trend*	**0.032**	*p-trend*	**0.007**
GIRLS									
BMI	Normal-low	(Reference)		(Reference)		(Reference)		(Reference)	
	Normal-high	0.05 [-0.02; 0.12]	0.146	0.03 [-0.04; 0.09]	0.448	-0.01 [-0.12; 0.11]	0.906	-0.92 [-1.85; 0.02]	0.055
	Overweight	0.12 [0.04; 0.21]	**0.005**	0.05 [-0.03; 0.13]	0.190	-0.02 [-0.16; 0.12]	0.764	-1.73 [-2.83; -0.62]	**0.002**
	Obese	0.20 [0.08; 0.33]	**0.002**	0.06 [-0.05; 0.18]	0.279	-0.03 [-0.24; 0.17]	0.750	-3.25 [-4.88; -1.63]	**<0.0001**
		p-trend	**<0.0001**	*p-trend*	0.151	*p-trend*	0.702	*p-trend*	**<0.0001**
LBMI	Low	(Reference)		(Reference)		(Reference)		(Reference)	
	Medium-low	0.17 [0.08; 0.26]	**<0.0001**	0.16 [0.07; 0.25]	**<0.0001**	0.21 [0.06; 0.36]	**0.005**	-0.18 [-1.40; 1.04]	0.772
	Medium-high	0.29 [0.20; 0.39]	**<0.0001**	0.24 [0.15; 0.33]	**<0.0001**	0.26 [0.10; 0.41]	**0.001**	-0.62 [-1.88; 0.64]	0.333
	High	0.38 [0.25; 0.51]	**<0.0001**	0.29 [0.17; 0.41]	**<0.0001**	0.33 [0.12; 0.53]	**0.002**	-1.45 [-3.11; 0.22]	0.088
		p-trend	**<0.0001**	*p-trend*	**<0.0001**	*p-trend*	**0.002**	*p-trend*	**0.040**
FMI	Low	(Reference)		(Reference)		(Reference)		(Reference)	
	Medium-low	-0.02 [-0.10; 0.06]	0.628	-0.02 [-0.10; 0.06]	0.557	-0.03 [-0.17; 0.11]	0.658	-0.64 [-1.75; 0.48]	0.264
	Medium-high	0.00 [-0.09; 0.09]	0.971	-0.03 [-0.11; 0.06]	0.530	-0.07 [-0.22; 0.07]	0.318	-1.13 [-2.29; 0.04]	0.058
	High	0.04 [-0.07; 0.15]	0.495	-0.04 [-0.14; 0.06]	0.466	-0.13 [-0.31; 0.05]	0.166	-2.34 [-3.79; -0.9]	**0.002**
		p-trend	0.462	*p-trend*	0.405	*p-trend*	0.101	*p-trend*	**0.001**

Definition of abbreviations: BMI, body mass index; FEF$_{25-75}$ forced expiratory flow at 25-75%; FEV$_1$, volume expired in the first second; FMI, fat mass index; FVC, forced vital capacity; LBMI, lean body mass index; 95% CI, 95% confidence intervals; β, estimate of regression coefficient. Models are adjusted for maternal social class, maternal smoking during pregnancy, birth weight, breastfeeding, lung function measures at 8 years, pubertal status (age at menarche for girls and voice break status at age 15 years for boys), as well as age and height at 15 years. Models for FMI and LBMI are also mutually adjusted. Bold: p-value <0.05

Table E12. Adjusted associations of body weight and composition trajectories with post-bronchodilation lung function measures at age 15 years: Without adjustment for lung function at 8 years

		FVC (L)		FEV$_1$ (L)		FEF$_{25-75}$ (L/s)		FEV$_1$/FVC (%)	
		Adjusted β [95% CI]	p-value	Adjusted β [95% CI]	p-value	Adjusted β [95% CI]	p-value	Adjusted β [95% CI]	p-value
BOYS									
BMI	Normal-low	(Reference)		(Reference)		(Reference)		(Reference)	
	Normal-high	0.18 [0.09; 0.28]	**<0.0001**	0.15 [0.07; 0.24]	**<0.0001**	0.20 [0.06; 0.35]	**0.007**	-0.43 [-1.30; 0.45]	0.338
	Overweight	0.29 [0.18; 0.39]	**<0.0001**	0.21 [0.12; 0.31]	**<0.0001**	0.24 [0.07; 0.41]	**0.007**	-1.18 [-2.21; -0.16]	**0.024**
	Obese	0.26 [0.10; 0.41]	**0.001**	0.09 [-0.05; 0.22]	0.212	-0.10 [-0.34; 0.14]	0.421	-2.68 [-4.12; -1.24]	**<0.0001**
		p-trend	**<0.0001**	*p-trend*	**0.001**	*p-trend*	0.336	*p-trend*	**<0.0001**
LBMI	Low	(Reference)		(Reference)		(Reference)		(Reference)	
	Medium-low	0.23 [0.09; 0.37]	**0.002**	0.18 [0.05; 0.31]	**0.008**	0.17 [-0.06; 0.40]	0.143	-0.67 [-2.08; 0.74]	0.352
	Medium-high	0.47 [0.33; 0.62]	**<0.0001**	0.39 [0.26; 0.53]	**<0.0001**	0.43 [0.20; 0.66]	**<0.0001**	-0.76 [-2.18; 0.66]	0.295
	High	0.73 [0.56; 0.90]	**<0.0001**	0.59 [0.44; 0.74]	**<0.0001**	0.59 [0.32; 0.86]	**<0.0001**	-1.27 [-2.91; 0.37]	0.128
		p-trend	**<0.0001**	*p-trend*	**<0.0001**	*p-trend*	**<0.0001**	*p-trend*	0.111
FMI	Low	(Reference)		(Reference)		(Reference)		(Reference)	
	Medium-low	0.05 [-0.05; 0.15]	0.312	0.09 [0.00; 0.17]	**0.049**	0.2 [0.05; 0.36]	**0.010**	0.91 [-0.02; 1.84]	0.055
	Medium-high	0.04 [-0.06; 0.15]	0.410	0.02 [-0.07; 0.12]	0.649	0.03 [-0.14; 0.20]	0.755	-0.67 [-1.70; 0.36]	0.201
	High	0.00 [-0.13; 0.14]	0.982	-0.09 [-0.21; 0.03]	0.129	-0.20 [-0.42; 0.01]	0.066	-2.02 [-3.31; -0.73]	**0.002**
		p-trend	0.796	*p-trend*	0.171	*p-trend*	0.067	*p-trend*	**<0.0001**
GIRLS									
BMI	Normal-low	(Reference)		(Reference)		(Reference)		(Reference)	
	Normal-high	0.16 [0.08; 0.23]	**<0.0001**	0.11 [0.04; 0.19]	**0.003**	0.13 [-0.01; 0.26]	0.066	-1.11 [-2.02; -0.20]	**0.017**
	Overweight	0.26 [0.17; 0.35]	**<0.0001**	0.16 [0.07; 0.24]	**<0.0001**	0.08 [-0.08; 0.24]	0.324	-2.43 [-3.49; -1.37]	**<0.0001**
	Obese	0.42 [0.28; 0.55]	**<0.0001**	0.25 [0.13; 0.38]	**<0.0001**	0.09 [-0.15; 0.32]	0.470	-3.88 [-5.43; -2.32]	**<0.0001**
		p-trend	**<0.0001**	*p-trend*	**<0.0001**	*p-trend*	0.404	*p-trend*	**<0.0001**
LBMI	Low	(Reference)		(Reference)		(Reference)		(Reference)	
	Medium-low	0.23 [0.14; 0.33]	**<0.0001**	0.23 [0.13; 0.32]	**<0.0001**	0.34 [0.17; 0.52]	**<0.0001**	0.65 [-0.52; 1.82]	0.277
	Medium-high	0.42 [0.32; 0.52]	**<0.0001**	0.37 [0.27; 0.47]	**<0.0001**	0.43 [0.25; 0.61]	**<0.0001**	-0.22 [-1.43; 0.99]	0.719
	High	0.57 [0.43; 0.70]	**<0.0001**	0.45 [0.33; 0.58]	**<0.0001**	0.44 [0.20; 0.68]	**<0.0001**	-1.43 [-3.02; 0.17]	0.079
		p-trend	**<0.0001**	*p-trend*	**<0.0001**	*p-trend*	**<0.0001**	*p-trend*	**0.013**
FMI	Low	(Reference)		(Reference)		(Reference)		(Reference)	
	Medium-low	0.06 [-0.03; 0.15]	0.182	0.04 [-0.05; 0.12]	0.400	0.11 [-0.05; 0.27]	0.189	-0.85 [-1.94; 0.24]	0.127
	Medium-high	0.10 [0.01; 0.20]	**0.030**	0.05 [-0.04; 0.14]	0.296	0.05 [-0.12; 0.21]	0.591	-1.66 [-2.78; -0.54]	**0.004**
	High	0.15 [0.04; 0.27]	**0.010**	0.05 [-0.06; 0.16]	0.387	-0.02 [-0.23; 0.19]	0.865	-2.69 [-4.08; -1.31]	**<0.0001**
		p-trend	**0.007**	*p-trend*	0.450	*p-trend*	0.489	*p-trend*	**<0.0001**

Definition of abbreviations: BMI, body mass index; FEF$_{25-75}$ forced expiratory flow at 25-75%; FEV$_1$, volume expired in the first second; FMI, fat mass index; FVC, forced vital capacity; LBMI, lean body mass index; 95% CI, 95% confidence intervals; β, estimate of regression coefficient. Models are adjusted for maternal social class, maternal smoking during pregnancy, birth weight, breastfeeding, pubertal status (age at menarche for girls and voice break status at age 15 years for boys), as well as age and height at 15 years. Models for FMI and LBMI are also mutually adjusted. Bold: p-value <0.05

Table E13. Adjusted associations of body weight and composition trajectories with post-bronchodilation lung function measures at age 15 years: Using lung function measures as standard deviation scores derived using the Global Lung Initiative equations

		FVC (L)		FEV$_1$ (L)		FEF$_{25-75}$ (L/s)		FEV$_1$/FVC (%)	
		Adjusted β [95% CI]	p-value	Adjusted β [95% CI]	p-value	Adjusted β [95% CI]	p-value	Adjusted β [95% CI]	p-value
BOYS									
BMI	Normal-low	(Reference)		(Reference)		(Reference)		(Reference)	
	Normal-high	0.36 [0.18; 0.54]	**<0.0001**	0.38 [0.2; 0.56]	**<0.0001**	0.25 [0.11; 0.39]	**0.001**	0.01 [-0.15; 0.16]	0.935
	Overweight	0.51 [0.29; 0.73]	**<0.0001**	0.42 [0.2; 0.63]	**<0.0001**	0.18 [0.01; 0.36]	**0.037**	-0.18 [-0.37; 0.01]	0.058
	Obese	0.61 [0.31; 0.92]	**<0.0001**	0.44 [0.13; 0.75]	**0.006**	0.12 [-0.13; 0.37]	0.335	-0.30 [-0.56; -0.04]	**0.025**
		p-trend	**<0.0001**	p-trend	**<0.0001**	p-trend	0.070	p-trend	**0.009**
LBMI	Low	(Reference)		(Reference)		(Reference)		(Reference)	
	Medium-low	0.56 [0.27; 0.84]	**<0.0001**	0.55 [0.26; 0.85]	**<0.0001**	0.27 [0.04; 0.50]	**0.024**	-0.10 [-0.36; 0.15]	0.433
	Medium-high	0.95 [0.66; 1.23]	**<0.0001**	0.99 [0.69; 1.28]	**<0.0001**	0.53 [0.30; 0.76]	**<0.0001**	-0.04 [-0.29; 0.22]	0.763
	High	1.32 [0.99; 1.65]	**<0.0001**	1.28 [0.94; 1.62]	**<0.0001**	0.64 [0.37; 0.91]	**<0.0001**	-0.17 [-0.46; 0.12]	0.247
		p-trend	**<0.0001**	p-trend	**<0.0001**	p-trend	**<0.0001**	p-trend	0.614
FMI	Low	(Reference)		(Reference)		(Reference)		(Reference)	
	Medium-low	0.13 [-0.06; 0.31]	0.176	0.19 [0.00; 0.38]	**0.045**	0.19 [0.04; 0.34]	**0.011**	0.13 [-0.03; 0.29]	0.110
	Medium-high	0.17 [-0.04; 0.38]	0.107	0.06 [-0.15; 0.27]	0.549	-0.01 [-0.18; 0.16]	0.917	-0.18 [-0.37; 0.00]	**0.046**
	High	0.10 [-0.18; 0.37]	0.487	-0.07 [-0.34; 0.21]	0.637	-0.12 [-0.34; 0.10]	0.302	-0.27 [-0.51; -0.03]	**0.025**
		p-trend	0.255	p-trend	0.633	p-trend	0.174	p-trend	**0.002**
GIRLS									
BMI	Normal-low	(Reference)		(Reference)		(Reference)		(Reference)	
	Normal-high	0.34 [0.16; 0.51]	**<0.0001**	0.33 [0.14; 0.52]	**0.001**	0.25 [0.08; 0.41]	**0.003**	-0.07 [-0.23; 0.10]	0.425
	Overweight	0.59 [0.4; 0.78]	**<0.0001**	0.54 [0.32; 0.75]	**<0.0001**	0.26 [0.07; 0.44]	**0.007**	-0.25 [-0.44; -0.07]	**0.008**
	Obese	0.94 [0.65; 1.23]	**<0.0001**	0.79 [0.47; 1.11]	**<0.0001**	0.35 [0.07; 0.63]	**0.014**	-0.48 [-0.76; -0.20]	**0.001**
		p-trend	**<0.0001**	p-trend	**<0.0001**	p-trend	**0.003**	p-trend	**<0.0001**
LBMI	Low	(Reference)		(Reference)		(Reference)		(Reference)	
	Medium-low	0.44 [0.22; 0.65]	**<0.0001**	0.50 [0.25; 0.74]	**<0.0001**	0.40 [0.19; 0.61]	**<0.0001**	0.07 [-0.14; 0.29]	0.503
	Medium-high	0.71 [0.48; 0.94]	**<0.0001**	0.78 [0.53; 1.03]	**<0.0001**	0.56 [0.34; 0.78]	**<0.0001**	0.02 [-0.20; 0.24]	0.839
	High	1.13 [0.83; 1.43]	**<0.0001**	1.04 [0.71; 1.37]	**<0.0001**	0.55 [0.26; 0.83]	**<0.0001**	-0.26 [-0.55; 0.03]	0.076
		p-trend	**<0.0001**	p-trend	**<0.0001**	p-trend	**<0.0001**	p-trend	0.069
FMI	Low	(Reference)		(Reference)		(Reference)		(Reference)	
	Medium-low	0.17 [-0.04; 0.37]	0.105	0.19 [-0.04; 0.42]	0.103	0.20 [0.00; 0.39]	0.052	-0.02 [-0.22; 0.18]	0.862
	Medium-high	0.26 [0.05; 0.47]	**0.014**	0.25 [0.02; 0.48]	**0.030**	0.11 [-0.09; 0.31]	0.266	-0.13 [-0.33; 0.08]	0.216
	High	0.45 [0.19; 0.71]	**0.001**	0.37 [0.08; 0.65]	**0.011**	0.15 [-0.10; 0.40]	0.230	-0.29 [-0.55; -0.04]	**0.023**
		p-trend	**<0.0001**	p-trend	**0.013**	p-trend	0.603	p-trend	**0.006**

Definition of abbreviations: BMI, body mass index; FEF$_{25-75}$ forced expiratory flow at 25-75%; FEV$_1$, volume expired in the first second; FMI, fat mass index; FVC, forced vital capacity; LBMI, lean body mass index; 95% CI, 95% confidence intervals; β, estimate of regression coefficient. Models are adjusted for maternal social class, maternal smoking during pregnancy, birth weight, breastfeeding, lung function measures at 8 years and pubertal status (age at menarche for girls and voice break for boys status at age 15 years for boys). Models for FMI and LBMI are also mutually adjusted. Bold: p-value <0.05

Table E14. Adjusted associations of body weight and composition trajectories with pre-bronchodilation lung function growth rates from age 8 to 15 years: Models additionally adjusted for wear-time spent in MVPA and total energy intake

		FVC change (mL/year)		FEV$_1$ change (mL/year)		FEF$_{25-75}$ change (mL/s·year)	
		Adjusted β [95% CI]	p-value	Adjusted β [95% CI]	p-value	Adjusted β [95% CI]	p-value
BOYS							
BMI	Normal-low	(Reference)		(Reference)		(Reference)	
	Normal-high	28.7 [13.0; 44.5]	<0.0001	25.7 [11.7; 39.7]	<0.0001	26.5 [4.1; 48.9]	0.021
	Overweight	36.2 [16.9; 55.5]	<0.0001	26.6 [9.5; 43.7]	0.002	23.1 [-4.0; 50.3]	0.095
	Obese	20.5 [-8.7; 49.6]	0.168	6.0 [-19.7; 31.6]	0.647	-9.6 [-50.6; 31.4]	0.646
	p-trend		0.002		0.036		0.473
LBMI	Low	(Reference)		(Reference)		(Reference)	
	Medium-low	40.0 [15.4; 64.7]	0.002	34.6 [12.4; 56.8]	0.002	36.8 [0.9; 72.8]	0.044
	Medium-high	72.2 [47.4; 97.1]	<0.0001	63.4 [41.1; 85.7]	<0.0001	59.9 [23.9; 96.0]	0.001
	High	95.0 [66.1; 124]	<0.0001	79.3 [53.4; 105.1]	<0.0001	73.9 [32.1; 115.7]	0.001
	p-trend		<0.0001		<0.0001		<0.0001
FMI	Low	(Reference)		(Reference)		(Reference)	
	Medium-low	6.0 [-10.3; 22.3]	0.470	7.4 [-7.1; 21.9]	0.318	17.2 [-6.5; 40.8]	0.155
	Medium-high	8.1 [-10.5; 26.6]	0.393	0.5 [-15.9; 17.0]	0.948	-0.6 [-27.5; 26.3]	0.963
	High	-10.1 [-35.0; 14.9]	0.429	-21.0 [-43.1; 1.0]	0.062	-22.2 [-58.2; 13.8]	0.226
	p-trend		0.832		0.132		0.235
GIRLS							
BMI	Normal-low	(Reference)		(Reference)		(Reference)	
	Normal-high	2.8 [-9.4; 14.9]	0.654	-0.5 [-11.8; 10.8]	0.933	-10.9 [-30.6; 8.9]	0.282
	Overweight	11.9 [-2.4; 26.2]	0.103	3.4 [-9.9; 16.7]	0.615	-13.7 [-36.8; 9.4]	0.244
	Obese	20.8 [-0.8; 42.4]	0.059	3.9 [-16.2; 23.9]	0.706	-11.4 [-46.3; 23.5]	0.520
	p-trend		0.028		0.558		0.301
LBMI	Low	(Reference)		(Reference)		(Reference)	
	Medium-low	27.4 [12.1; 42.7]	<0.0001	25.3 [10.9; 39.8]	0.001	33.0 [7.7; 58.3]	0.011
	Medium-high	43.5 [27.4; 59.6]	<0.0001	35.5 [20.4; 50.6]	<0.0001	33.9 [7.5; 60.2]	0.012
	High	50.7 [29.4; 72]	<0.0001	36.6 [16.7; 56.5]	<0.0001	34.6 [-0.2; 69.4]	0.052
	p-trend		<0.0001		<0.0001		0.056
FMI	Low	(Reference)		(Reference)		(Reference)	
	Medium-low	-3.9 [-18.0; 10.2]	0.588	-2.8 [-16.1; 10.5]	0.676	-4.0 [-27.5; 19.5]	0.738
	Medium-high	-4.7 [-19.5; 10.1]	0.534	-7.1 [-20.9; 6.7]	0.316	-16.9 [-41.4; 7.6]	0.177
	High	2.5 [-16.1; 21.2]	0.792	-5.1 [-22.6; 12.4]	0.569	-16.5 [-47.4; 14.5]	0.296
	p-trend		0.973		0.295		0.098

Rate of lung function growth for each parameter was calculated as: (pre-bronchodilation lung function measure at 15 years - pre-bronchodilation lung function measure at 8 years)/time follow-up. Definition of abbreviations: BMI, body mass index; FEF$_{25-75}$ forced expiratory flow at 25-75%; FEV$_1$, volume expired in the first second; FMI, fat mass index; FVC, forced vital capacity; LBMI, lean body mass index; 95% CI, 95% confidence intervals; β, estimate of regression coefficient. Models are adjusted for maternal social class, maternal smoking during pregnancy, birth weight, breastfeeding, total energy intake at 7 years, lung function measures at 8 years, wear-time spent in MVPA at 11 years, pubertal status (age at menarche for girls and voice break status at age 15 years for boys), as well as age and height at 15 years. Models for FMI and LBMI are also mutually adjusted. Bold: p-value <0.05

Table E15. Adjusted associations of body weight and composition trajectories with pre-bronchodilation lung function growth rates from age 8 to 15 years: Excluding children with lifetime doctor asthma (n=865)

			FVC change (mL/year)		FEV$_1$ change (mL/year)		FEF$_{25-75}$ change (mL/s·year)	
			Adjusted β [95% CI]	p-value	Adjusted β [95% CI]	p-value	Adjusted β [95% CI]	p-value
BOYS								
BMI	Normal-low		(Reference)		(Reference)		(Reference)	
	Normal-high		26.8 [10.7; 42.9]	**0.001**	23.5 [9.2; 37.7]	**0.001**	27.5 [5.2; 49.7]	**0.016**
	Overweight		30.8 [11.5; 50.0]	**0.002**	21.4 [4.2; 38.6]	**0.015**	20.2 [-6.2; 46.6]	0.134
	Obese		10.9 [-17.1; 38.8]	0.446	-8.8 [-33.4; 15.8]	0.482	-24.4 [-62.8; 14.0]	0.212
			p-trend	**0.026**	p-trend	0.404	p-trend	0.985
LBMI	Low		(Reference)		(Reference)		(Reference)	
	Medium-low		33.1 [6.4; 59.7]	**0.015**	27.8 [3.5; 52.0]	**0.025**	26.0 [-12.0; 64.0]	0.179
	Medium-high		71.5 [44.6; 98.3]	**<0.0001**	58.4 [34.0; 82.8]	**<0.0001**	49.5 [11.3; 87.7]	**0.011**
	High		98.7 [66.9; 130.4]	**<0.0001**	77.3 [48.6; 106.0]	**<0.0001**	67.3 [22.3; 112.3]	**0.003**
			p-trend	**<0.0001**	p-trend	**<0.0001**	p-trend	**<0.0001**
FMI	Low		(Reference)		(Reference)		(Reference)	
	Medium-low		7.5 [-8.9; 23.9]	0.369	12.6 [-2.0; 27.2]	0.092	29.1 [5.7; 52.4]	**0.015**
	Medium-high		6.2 [-12.1; 24.5]	0.505	2.8 [-13.5; 19.2]	0.736	5.7 [-20.4; 31.7]	0.669
	High		-17.5 [-41.0; 6.0]	0.144	-28.5 [-49.3; -7.7]	**0.007**	-32.0 [-65.3; 1.3]	0.059
			p-trend	0.368	p-trend	**0.030**	p-trend	0.088
GIRLS								
BMI	Normal-low		(Reference)		(Reference)		(Reference)	
	Normal-high		7.1 [-4.7; 18.9]	0.237	1.7 [-9.3; 12.8]	0.757	-1.9 [-20.5; 16.8]	0.844
	Overweight		16.5 [2.3; 30.7]	**0.023**	6.6 [-6.6; 19.9]	0.327	-2.3 [-24.6; 20.0]	0.839
	Obese		30.4 [7.3; 53.4]	**0.010**	13.6 [-7.7; 34.9]	0.210	10.3 [-26.0; 46.5]	0.578
			p-trend	**0.003**	p-trend	0.169	p-trend	0.846
LBMI	Low		(Reference)		(Reference)		(Reference)	
	Medium-low		29.5 [14.7; 44.3]	**<0.0001**	24.8 [10.7; 38.8]	**0.001**	28.5 [4.8; 52.2]	**0.018**
	Medium-high		43.5 [27.7; 59.2]	**<0.0001**	36.3 [21.5; 51.2]	**<0.0001**	42.6 [17.9; 67.3]	**0.001**
	High		58.2 [36.7; 79.8]	**<0.0001**	43.7 [23.4; 64.0]	**<0.0001**	50.5 [16.3; 84.6]	**0.004**
			p-trend	**<0.0001**	p-trend	**<0.0001**	p-trend	**0.001**
FMI	Low		(Reference)		(Reference)		(Reference)	
	Medium-low		-3.6 [-17.5; 10.3]	0.613	-5.7 [-18.8; 7.3]	0.387	-6.4 [-28.8; 16.0]	0.576
	Medium-high		0.7 [-13.8; 15.1]	0.928	-4.8 [-18.3; 8.7]	0.487	-12.5 [-35.7; 10.8]	0.294
	High		5.6 [-13.1; 24.3]	0.559	-3.8 [-21.3; 13.6]	0.668	-16.0 [-46.1; 14.2]	0.299
			p-trend	0.484	p-trend	0.651	p-trend	0.194

Definition of abbreviations: BMI, body mass index; FEF$_{25-75}$ forced expiratory flow at 25-75%; FEV$_1$, volume expired in the first second; FMI, fat mass index; FVC, forced vital capacity; LBMI, lean body mass index; 95% CI, 95% confidence intervals; β, estimate of regression coefficient. Models are adjusted for maternal social class, maternal smoking during pregnancy, birth weight, breastfeeding, lung function measures at 8 years, pubertal status (age at menarche for girls and voice break status at age 15 years for boys), as well as age and height at 15 years. Models for FMI and LBMI are also mutually adjusted. Bold: p-value <0.05

Table E16. Adjusted associations of body weight and composition trajectories with pre-bronchodilation lung function growth rates from age 8 to 15 years: Excluding children with extreme lung function growth rates (<p1 and p>99)

		FVC change (mL/year)		FEV$_1$ change (mL/year)		FEF$_{25-75}$ change (mL/s·year)	
		Adjusted β [95% CI]	p-value	Adjusted β [95% CI]	p-value	Adjusted β [95% CI]	p-value
BOYS							
BMI	Normal-low	(Reference)		(Reference)		(Reference)	
	Normal-high	22.0 [9.5; 34.4]	**0.001**	17.8 [6.8; 28.8]	**0.002**	22.8 [4.5; 41.1]	**0.015**
	Overweight	30.2 [15.4; 45.0]	**<0.0001**	21.9 [8.6; 35.1]	**0.001**	24.8 [2.9; 46.7]	**0.026**
	Obese	24.9 [3.5; 46.2]	0.023	1.5 [-17.0; 20.0]	0.876	-13.7 [-44.4; 17.0]	0.381
	p-trend		**<0.0001**		0.06		0.523
LBMI	Low	(Reference)		(Reference)		(Reference)	
	Medium-low	28.9 [9.1; 48.7]	**0.004**	28.2 [10.5; 45.8]	**0.002**	25.7 [4.9; 46.5]	**0.016**
	Medium-high	63.6 [43.7; 83.6]	**<0.0001**	57.4 [39.6; 75.2]	**<0.0001**	34.0 [12.5; 55.5]	**0.002**
	High	83.0 [59.5; 106.4]	**<0.0001**	70.4 [49.6; 91.2]	**<0.0001**	42.1 [13.8; 70.4]	**0.004**
	p-trend		**<0.0001**		**<0.0001**		**0.003**
FMI	Low	(Reference)		(Reference)		(Reference)	
	Medium-low	4.9 [-7.9; 17.7]	0.450	3.3 [-8.0; 14.6]	0.566	6.1 [-12.7; 25.0]	0.523
	Medium-high	4.7 [-9.5; 18.9]	0.518	-2.8 [-15.4; 9.8]	0.659	-4.0 [-23.6; 15.6]	0.688
	High	-5.3 [-23.8; 13.2]	0.572	-21.4 [-37.6; -5.3]	**0.009**	-13.3 [-37.5; 10.9]	0.281
	p-trend		0.814		**0.018**		0.127
GIRLS							
BMI	Normal-low	(Reference)		(Reference)		(Reference)	
	Normal-high	7.1 [-2.3; 16.6]	0.140	4.7 [-4.1; 13.5]	0.297	-0.1 [-16.0; 15.8]	0.990
	Overweight	14.5 [3.3; 25.7]	**0.011**	6.5 [-3.9; 16.8]	0.219	-3.2 [-21.7; 15.3]	0.734
	Obese	25.4 [8.5; 42.3]	**0.003**	9.9 [-5.8; 25.6]	0.215	-0.4 [-28.3; 27.5]	0.979
	p-trend		**0.001**		0.148		0.810
LBMI	Low	(Reference)		(Reference)		(Reference)	
	Medium-low	18.6 [6.5; 30.7]	**0.003**	18.7 [7.3; 30.1]	**0.001**	31.3 [10.9; 51.6]	**0.003**
	Medium-high	35.0 [22.2; 47.8]	**<0.0001**	30.2 [18.3; 42.1]	**<0.0001**	33.5 [12.4; 54.7]	**0.002**
	High	43.8 [26.8; 60.9]	**<0.0001**	32.5 [16.6; 48.4]	**<0.0001**	43.9 [15.6; 72.1]	**0.002**
	p-trend		**<0.0001**		**<0.0001**		**0.005**
FMI	Low	(Reference)		(Reference)		(Reference)	
	Medium-low	-0.9 [-12.0; 10.2]	0.875	1.4 [-9.0; 11.8]	0.793	0.6 [-18.3; 19.5]	0.950
	Medium-high	0.3 [-11.3; 12.0]	0.955	-0.7 [-11.5; 10.1]	0.897	-4.6 [-24.2; 15.1]	0.649
	High	6.2 [-8.3; 20.7]	0.399	-1.7 [-15.2; 11.7]	0.801	-9.3 [-33.8; 15.2]	0.455
	p-trend		0.462		0.573		0.303

Definition of abbreviations: BMI, body mass index; FEF$_{25-75}$ forced expiratory flow at 25-75%; FEV$_1$, volume expired in the first second; FMI, fat mass index; FVC, forced vital capacity; LBMI, lean body mass index; 95% CI, 95% confidence intervals; β, estimate of regression coefficient. Models are adjusted for maternal social class, maternal smoking during pregnancy, birth weight, breastfeeding, lung function measures at 8 years, pubertal status (age at menarche for girls and voice break status at age 15 years for boys), as well as age and height at 15 years. Models for FMI and LBMI are also mutually adjusted. Number of observations deleted from the adjusted models: FVC (boys/girls):262/303; FEV$_1$: 282/340; FEF$_{25-75}$:263/304. Bold: p-value <0.05

Table E17. Adjusted associations of body weight and composition trajectories with pre-bronchodilation lung function growth rates from age 8 to 15 years: Without adjustment for lung function at 8 years

		FVC change (mL/year)		FEV$_1$ change (mL/year)		FEF$_{25-75}$ change (mL/s·year)	
		Adjusted β [95% CI]	p-value	Adjusted β [95% CI]	p-value	Adjusted β [95% CI]	p-value
BOYS							
BMI	Normal-low	(Reference)		(Reference)		(Reference)	
	Normal-high	21.4 [8.0; 34.9]	**0.002**	20.6 [8.8; 32.4]	**0.001**	24.9 [6.0; 43.7]	**0.010**
	Overweight	24.3 [8.3; 40.2]	**0.003**	18.7 [4.7; 32.7]	**0.009**	19.7 [-2.6; 42.1]	0.083
	Obese	10.8 [-11.8; 33.4]	0.349	-2.4 [-22.2; 17.4]	0.812	-14.1 [-45.9; 17.6]	0.382
	p-trend		**0.022**		0.209		0.728
LBMI	Low	(Reference)		(Reference)		(Reference)	
	Medium-low	32.9 [11.3; 54.4]	**0.003**	30.3 [11.2; 49.5]	**0.002**	31.0 [0.2; 61.7]	**0.048**
	Medium-high	64.9 [43.2; 86.6]	**<0.0001**	57.6 [38.4; 76.9]	**<0.0001**	54.7 [23.7; 85.6]	**0.001**
	High	86.0 [60.8; 111.3]	**<0.0001**	73.8 [51.5; 96.1]	**<0.0001**	69.3 [33.3; 105.3]	**<0.0001**
	p-trend		**<0.0001**		**<0.0001**		**<0.0001**
FMI	Low	(Reference)		(Reference)		(Reference)	
	Medium-low	7.0 [-7.0; 20.9]	0.326	9.6 [-2.6; 21.9]	0.122	20.1 [0.2; 40.1]	0.047
	Medium-high	3.4 [-12.1; 18.9]	0.666	-1.9 [-15.5; 11.7]	0.782	-4.9 [-26.9; 17.2]	0.665
	High	-17.6 [-37.5; 2.2]	0.082	-24.7 [-42.0; -7.3]	**0.005**	-24.5 [-52.9; 3.8]	0.090
	p-trend		0.195		**0.009**		**0.048**
GIRLS							
BMI	Normal-low	(Reference)		(Reference)		(Reference)	
	Normal-high	7.0 [-3.4; 17.4]	0.186	4.1 [-5.7; 13.9]	0.411	-0.5 [-17.4; 16.5]	0.959
	Overweight	16.2 [4.1; 28.4]	**0.009**	7.9 [-3.5; 19.4]	0.173	-2.2 [-22.1; 17.7]	0.829
	Obese	26.3 [8.1; 44.5]	**0.005**	9.2 [-7.8; 26.1]	0.290	-5.7 [-35.4; 24.0]	0.707
	p-trend		**0.001**		0.146		0.710
LBMI	Low	(Reference)		(Reference)		(Reference)	
	Medium-low	24.5 [11.2; 37.8]	**<0.0001**	23.2 [10.6; 35.7]	**<0.0001**	30.6 [8.7; 52.5]	**0.006**
	Medium-high	40.0 [26.3; 53.8]	**<0.0001**	34.9 [21.9; 47.9]	**<0.0001**	36.9 [14.2; 59.6]	**0.001**
	High	51.6 [33.3; 69.9]	**<0.0001**	40.6 [23.4; 57.7]	**<0.0001**	45.1 [15.0; 75.2]	**0.003**
	p-trend		**<0.0001**				**0.003**
FMI	Low	(Reference)		(Reference)		(Reference)	
	Medium-low	-3.7 [-16.1; 8.6]	0.550	-3.6 [-15.1; 8.0]	0.545	-3.9 [-24.2; 16.4]	0.706
	Medium-high	-1.2 [-14; 11.6]	0.850	-3.9 [-15.8; 8.1]	0.527	-9.4 [-30.5; 11.8]	0.386
	High	3.4 [-12.6; 19.3]	0.679	-5.9 [-20.8; 9.0]	0.436	-17.1 [-43.3; 9.2]	0.202
	p-trend		0.669		0.381		0.131

Definition of abbreviations: BMI, body mass index; FEF$_{25-75}$ forced expiratory flow at 25-75%; FEV$_1$, volume expired in the first second; FMI, fat mass index; FVC, forced vital capacity; LBMI, lean body mass index; 95% CI, 95% confidence intervals; β, estimate of regression coefficient. Models are adjusted for maternal social class, maternal smoking during pregnancy, birth weight, breastfeeding, pubertal status (age at menarche for girls and voice break status at age 15 years for boys), as well as age and height at 15 years. Models for FMI and LBMI are also mutually adjusted. Bold: p-value <0.05

Table E18. Adjusted associations of body weight and composition trajectories with pre-bronchodilation lung function growth rates from age 8 to 15 years: Using lung function measures as standard deviation scores derived using the Global Lung Initiative equations

		FVC change (mL/year)		FEV$_1$ change (mL/year)		FEF$_{25\text{-}75}$ change (mL/s·year)	
		Adjusted β [95% CI]	p-value	Adjusted β [95% CI]	p-value	Adjusted β [95% CI]	p-value
BOYS							
BMI	Normal-low	(Reference)		(Reference)		(Reference)	
	Normal-high	50.9 [26.4; 75.5]	**<0.0001**	51.6 [27.7; 75.5]	**<0.0001**	33.8 [13.9; 53.7]	**0.001**
	Overweight	71.9 [42.8; 101.0]	**<0.0001**	60.1 [31.7; 88.5]	**<0.0001**	36.2 [12.6; 59.9]	**0.003**
	Obese	54.6 [13.6; 95.7]	**0.009**	31.9 [-7.8; 71.7]	0.115	26.0 [-7.3; 59.3]	0.125
	p-trend		**<0.0001**		0.001		0.008
LBMI	Low	(Reference)		(Reference)		(Reference)	
	Medium-low	61.4 [21.5; 101.2]	**0.003**	60.7 [21.5; 99.8]	**0.002**	32.2 [-0.6; 65.1]	0.055
	Medium-high	124.7 [84.5; 164.8]	**<0.0001**	120.5 [81.1; 160.0]	**<0.0001**	58.3 [25.3; 91.3]	**0.001**
	High	170.8 [124.3; 217.3]	**<0.0001**	157.8 [112.4; 203.3]	**<0.0001**	75.3 [37.2; 113.5]	**<0.0001**
	p-trend		**<0.0001**		**<0.0001**		**<0.0001**
FMI	Low	(Reference)		(Reference)		(Reference)	
	Medium-low	18.7 [-6.8; 44.1]	0.150	23.3 [-1.4; 48.1]	0.065	24.7 [3.7; 45.8]	**0.021**
	Medium-high	26.6 [-1.7; 54.8]	0.065	12.1 [-15.4; 39.7]	0.387	9.3 [-14; 32.6]	0.433
	High	-6.4 [-42.7; 30.0]	0.731	-23.6 [-58.9; 11.7]	0.189	4.5 [-25.6; 34.5]	0.771
	p-trend		0.629		0.369		0.882
GIRLS							
BMI	Normal-low	(Reference)		(Reference)		(Reference)	
	Normal-high	24.0 [0.1; 47.9]	**0.049**	16.5 [-8.2; 41.1]	0.189	3.7 [-17.1; 24.5]	0.727
	Overweight	59.2 [31.1; 87.3]	**<0.0001**	40.0 [11.1; 68.9]	**0.007**	11.2 [-13.3; 35.6]	0.371
	Obese	95.2 [53.3; 137.1]	**<0.0001**	61.9 [19; 104.8]	**0.005**	22.6 [-13.9; 59.1]	0.224
	p-trend		0.369		0.001		0.192
LBMI	Low	(Reference)		(Reference)		(Reference)	
	Medium-low	58.1 [27.9; 88.4]	**<0.0001**	55.7 [24.2; 87.2]	**0.001**	34.4 [7.8; 61.1]	**0.011**
	Medium-high	95.0 [63.1; 126.9]	**<0.0001**	86.4 [53.5; 119.3]	**<0.0001**	45.9 [18.2; 73.6]	**0.001**
	High	139.5 [96.9; 182.2]	**<0.0001**	120.3 [76.2; 164.3]	**<0.0001**	63.0 [25.8; 100.3]	**0.001**
	p-trend		**<0.0001**		**<0.0001**		**0.001**
FMI	Low	(Reference)		(Reference)		(Reference)	
	Medium-low	-1.9 [-30.1; 26.2]	0.892	-0.7 [-29.8; 28.4]	0.962	6.4 [-18.5; 31.4]	0.613
	Medium-high	11.8 [-17.6; 41.1]	0.431	4.8 [-25.4; 35.0]	0.756	2.6 [-23.4; 28.6]	0.842
	High	34.2 [-1.9; 70.4]	0.063	14.1 [-23.2; 51.4]	0.458	5.1 [-27.0; 37.1]	0.755
	p-trend		**0.040**		0.448		0.951

Definition of abbreviations: BMI, body mass index; FEF$_{25\text{-}75}$ forced expiratory flow at 25-75%; FEV$_1$, volume expired in the first second; FMI, fat mass index; FVC, forced vital capacity; LBMI, lean body mass index; 95% CI, 95% confidence intervals; β, estimate of regression coefficient. Models are adjusted for maternal social class, maternal smoking during pregnancy, birth weight, breastfeeding, lung function measures at 8 years and pubertal status (age at menarche for girls and voice break for boys status at age 15 years for boys). Models for FMI and LBMI are also mutually adjusted. Bold: p-value <0.05

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