LifeCycle

WP4: Cardio-Metabolic Health Trajectories

Data Harmonization Manual

V2 - April 2020

V1 - July 2019

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Contents

Aim

The aim of work package 4 of LifeCycle is:

"to generate evidence from integrated research on exposure to early-life stressors during preconception, pregnancy and early childhood, in relation to life course trajectories of cardio-metabolic health"

We have developed a list of cardio-metabolic variables for the EU Child Cohort Network. The variables were selected based on the data available in participating cohorts. For many measures, including adiposity, blood based (adipokines, glycaemic/IR, lipids), peripheral BP and pulse rate, there are sufficient multiple studies and repeat measures to: i) summarise life course trajectories from early childhood to adolescence/early adulthood, (ii) replicate and validate, (iii)) apply causal methods.

Variables and instructions

The harmonized WP4 cardio-metabolic health variables include:
- Repeated anthropometry/body composition
- Repeated blood markers: glucose-related, lipid-related and adipokines
- Repeated cardiovascular measures
- Repeated parental pregnancy measures
- Blood markers from cord blood

Please note: the metabolomics data and fatty acid profiles will be harmonized at a later stage and are therefore not included in this manual: further details will follow. In addition, cardiac scans in the fetus and child, flow mediated dilatation and arterial distensibility are available in only a few cohorts and are also not included in this manual: details for harmonizing these variables can be provided in a later manual or can be done on a paper basis whereby the leaders of proposals would be in charge of coordinating the harmonization. Finally, an inventory of the cardiometabolic data available in each cohort is provided in Appendix A.

Variable prioritization

We have assigned two different levels of priority to the variables. The highest priority variables were selected based on the variables that are part of the main LifeCycle WP4 outcomes and on number of studies that have these data. Please note that the harmonisation table includes **2 additional repeated variables (heightmes_, weightmes_)** describing the methods used to obtain height and weight at each age (i.e. whether reported, measured or from medical records). The corresponding height and weight variables have previously been harmonized as part of WP1.

The following are the highest priority variables:
- Method used to measure child's height and weight
- DXA fat and lean mass and fat % from bioimpedance
- Blood markers
- peripheral blood pressure and pulse rate
- Maternal blood pressure in pregnancy

We suggest that you begin with the highest priority variables. Harmonisation of the highest priority variables should be completed by **September 2019**. Harmonisation of all the remaining variables should be completed by **February 2020**.

Variable harmonization

The WP4 variables harmonization table on page 5 provides the name, description and instructions for how to create the WP4 harmonised cardio-metabolic variables. A description of the required units for each variable is provided in the harmonization table. Further instruction are provided after the table.

WP4 variables harmonization table

	Variable name	Label/description	Values	Unit	Data Type	Further instructions
highest priority variables						
2nd highest priority variables						
Weight/height indicators for WP1						
Method used to measure child's height	heightmes_0 heightmes_1 … heightmes_215	Method used to measure child's height at each age when child's height was recorded for height_0, height_1, height_2 etc. This relates to the child height data harmonised in WP1.	0) Measured 1) Parent/self-reported 2) Medical record		Integer	
Method used to measure child's weight	weightmes_0 weightmes_1… weightmes_215	Method used to measure child's weight at each age when child's weight was recorded for weight_0, weight_1, weight_2 etc This relates to the child weight data harmonised in WP1.	0) Measured 1) Parent/self-reported 2) Medical record		Integer	
ANTHRO/BODY COMPOSITION						
Child's head circumference	headcirc_0 headcirc_1 … headcirc_215	Repeated measures of child's head circumference, headcirc_0: child's head circumference measured between ages 0 and <1 month. headcirc_1: measured between ages ≥1 and <2 months…. headcirc_215: measured between ages ≥215 and <216 months		cm	Decimal	use the average If >1 measure from same time & note N of repeats.
Age when child's head circumference recorded	headcircage_0 headcircage_1 …. headcircage_215	Exact age of the child (in days) when child's head circumference was recorded for headcirc_0, headcirc_1, headcirc_2 etc.		days	Decimal	
Method used to measure child's head circumference	headcircmes_0 headcircmes_1 … headcircmes_215	Method used to measure child's head circumference at each age when child's head circumference was recorded for headcirc_0, headcirc_1, headcirc_2 etc.	0) Measured 1) Parent/self-reported		Integer	Note any health record linkage
Child's waist circumference	waistcirc_0 waistcirc_1 … waistcirc_215	Repeated measures of child's waist circumference, waistcirc_0: measured between ages 0 and <1 month, waistcirc_1: measured between ages ≥1 and <2 months…. waistcirc_215: measured		cm	decimal	use the average If >1 measure

		between ages ≥215 and <216 months.				from same time & note N of repeats
Age when child's waist circumference recorded	waistcircage_0 waistcircage_1 …. waistcircage_215	Exact age of the child (in days) when child's waist circumference was recorded for waistcirc_0, waistcirc_1, waistcirc_2 etc.		days	Decimal	
Method used to measure child's waist circumference	waistcircmes_0 waistcircmes_1 … waistcircmes_215	Method used to measure child's waist circumference at each age when child's waist circumference was recorded for waistcirc_0, waistcirc_1, waistcirc_2 etc.	0) Measured 1) Parent/self-reported		Integer	Note any health record linkage
Child's hip circumference	hipcirc_0 hipcirc_1 … hipcirc_215	Repeated measures of child's hip circumference hipcirc_0: hip circumference measured between the ages of 0 and <1 month. hipcirc_1: measured between ages ≥1 and <2 months …. hipcirc_215: measured between ages ≥215 and <216 months		cm	Decimal	use the average If >1 measure from same time & note N of repeats
Age when child's hip circumference recorded	hipcircage_0 hipcircage_1 …. hipcircage_215	Exact age of the child (in days) when child's hip circumference was recorded for hipcirc_0, hipcirc_1, hipcirc_2 etc.		days	Decimal	
Method used to measure child's hip circumference	hipcircmes_0 hipcircmes_1 … hipcircmes_215	Method used to measure child's hip circumference at each age when child's hip circumference was recorded for hipcirc_0, hipcirc_1, hipcirc_2 etc.	0) Measured 1) Parent/self-reported		Integer	Note any health record linkage
Child's arm circumference	armcirc_0 armcirc_1 … armcirc_215	Repeated measures of child's arm circumference armcirc_0: child's arm circumference measured between the ages of 0 and <1 month. armcirc_1: measured between ages ≥1 and <2 months … armcirc_215: measured between ages ≥215 and <216 months		cm	Decimal	use the average If >1 measure from same time & note N of repeats
Age when child's arm circumference recorded	armcircage_0 armcircage_1 …. armcircage_215	Exact age of the child (in days) when child's arm circumference was recorded for armcirc_0, armcirc_1, armcirc_2 etc.		days	Decimal	

Method used to measure child's arm circumference	armcircmes_0 armcircmes_1 … armcircmes_215	Method used to measure child's arm circumference at each age when child's arm circumference was recorded for armcirc_0, armcirc_1, armcirc_2 etc.	0) Measured 1) Parent/self-reported		Integer	Note any health record linkage
Whether dominant or non-dominant arm used to measure circumference	Dominant armc_0 Dominant armc_1… Dominant armc_215	Whether arm circumference was measured on the dominant or non-dominant arm for armcirc_0, armcirc_1, armcirc_2 etc	0) Dominant 1) Non-dominant		Integer	
Child's DXA fat mass - whole-body	dxafm_0 dxafm_1 … dxafm_215	Repeated measures of child's whole-body DXA fat mass dxafm_0: child's DXA fat mass measured between the ages of 0 and <1 month. dxafm_1: measured between ages ≥1 and <2 months…. dxafm_215: measured between ages ≥215 and <216 months		grams	Decimal	
Age when child's DXA fat mass recorded	dxafmage_0 dxafmage_1 …. dxafmage_215	Exact age of the child (in days) when child's DXA fat mass was recorded for dxafm_0, dxafm_1, dxafm_2 etc.		days	Decimal	
Device used to measure child's DXA fat mass	dxafmmes_0 dxafmmes_1 … dxafmmes_215	Device used to measure child's DXA fat mass at each age when child's DXA fat mass was recorded for dxafm_0, dxafm_1, dxafm_2 etc.	0) Lunar Prodigy 1) Other		Integer	Note other devices used
Child's DXA lean mass - whole-body	dxalm_0 dxalm_1 … dxalm_215	Repeated measures of child's whole-body DXA lean fat mass dxalm_0: child's DXA lean mass measured between the ages of 0 and <1 month. dxalm_1: measured between ages ≥1 and <2 months…. dxalm_215: measured between ages ≥215 and <216 months		grams	Decimal	
Age when child's DXA lean mass recorded	dxalmage_0 dxalmage_1 …. dxalmage_215	Exact age of the child (in days) when child's DXA lean mass was recorded for dxalm_0, dxalm_1, dxalm_2 etc.		days	Decimal	
Device used to measure child's DXA lean mass	dxalmmes_0 dxalmmes_1 … dxalmmes_215	Device used to measure child's DXA lean mass at each age when child's DXA lean mass was recorded for dxalm_0, dxalm_1, dxalm_2 etc.	0) Lunar Prodigy 1) Other		Integer	Note other devices used
Child's % body fat from bioimpedance	bio_0 bio_1 … bio_215	Repeated measures of child's bioimpedance bio_0: child's bioimpedance measured between the ages of 0 and <1 month. bio_1: measured between ages ≥1 and <2 months …. bio_215: measured between ages ≥215 and <216 months		% body fat	Decimal	

Age when child's bioimpedance recorded	bioage_0 bioage_1 …. bioage_215	Exact age of the child (in days) when child's bioimpedance was recorded for bio_0, bio_1, bio_2 etc.		days	Decimal	
Device used to measure child's bioimpedance	biomes_0 biomes_1 … biomes_215	Device used to measure child's bioimpedance at each age when child's bioimpedance was recorded for bio_0, bio_1, bio_2 etc.	0) Tanita Body Fat Analyser 1) Other		Integer	Note other devices used
Child's biceps skinfold	bicepsf_0 bicepsf_1 … bicepsf_215	Repeated measures of child's biceps skinfold bicepsf_0: child's biceps skinfold measured between the ages of 0 and <1 month. bicepsf_1: measured between ages ≥1 and <2 months.... bicepsf_215: measured between ages ≥215 and <216 months		mm	Decimal	use the average If >1 measure from same time & note N of repeats
Age when child's biceps skinfold recorded	bicepsfage_0 bicepsfage_1 …. bicepsfage_215	Exact age of the child (in days) when child's biceps skinfold was recorded for bicepsf_0, bicepsf_1, bicepsf_2 etc.		days	Decimal	
Method used to measure child's biceps skinfold	bicepsfmes_0 bicepsfmes_1 … bicepsfmes_215	Method used to measure child's biceps skinfold at each age when child's biceps skinfold was recorded for bicepsf_0, bicepsf_1, bicepsf_2 etc.	0) Measured 1) Parent/self-reported		Integer	Note any health record linkage
Child's subscapular skinfold	subscapsf_0 subscapsf_1 … subscapsf_215	Repeated measures of child's subscapular skinfold subscapularsf_0: child's subscapular skinfold measured between the ages of 0 and <1 month. subscapularsf_1: measured between ages ≥1 and <2 months.... subscapularsf_215: measured between ages ≥215 and <216 months		mm	Decimal	use the average If >1 measure from same time & note N of repeats
Age when child's subscapular skinfold recorded	subscapsfage_0 subscapsfage_1 …. subscapsfage_215	Exact age of the child (in days) when child's subscapular skinfold was recorded for subscapularsf_0, subscapularsf_1, subscapularsf_2 etc.		days	Decimal	
Method used to measure child's subscapular skinfold	subscapsfmes_0 subscapsfmes_1 … subscapsfmes_215	Method used to measure child's subscapular skinfold at each age when child's subscapular skinfold was recorded for subscapularsf_0, subscapularsf_1, subscapularsf_2 etc.	0) Measured 1) Parent/self-reported		Integer	Note any health record linkage
Child's triceps skinfold	tricepsf_0 tricepsf_1 …	Repeated measures of child's triceps skinfold tricepsf_0: child's triceps skinfold measured between the ages of 0 and <1 month.		mm	Decimal	use the average If >1

	tricepsf_215	tricepsf_1: measured between ages ≥1 and <2 months.... tricepsf_215: measured between ages ≥215 and <216 months				measure from same time & note N of repeats
Age when child's triceps skinfold recorded	tricepsfage_0 tricepsfage_1 .... tricepsfage_215	Exact age of the child (in days) when child's triceps skinfold was recorded for tricepsf_0, tricepsf_1, tricepsf_2 etc.		days	Decimal	
Method used to measure child's triceps skinfold	tricepsfmes_0 tricepsfmes_1 … tricepsfmes_215	Method used to measure child's triceps skinfold at each age when child's triceps skinfold was recorded for tricepsf_0, tricepsf_1, tricepsf_2 etc.	0) Measured 1) Parent/self-reported		Integer	Note any health record linkage
Child's suprailiac skinfold	suprasf_0 suprasf_1 … suprasf_215	Repeated measures of child's suprailiac skinfold suprasf_0: child's suprailiac skinfold measured between the ages of 0 and <1 month. suprasf_1: measured between ages ≥1 and <2 months ...suprasf_215: measured between ≥215 and <216 months		mm	Decimal	use the average If >1 measure from same time & note N of repeats
Age when child's suprailiac skinfold recorded	suprasfage_0 suprasfage_1 .... suprasfage_215	Exact age of the child (in days) when child's suprailiac skinfold was recorded for suprasf_0, suprasf_1, suprasf_2 etc.		days	Decimal	
Method used to measure child's suprailiac skinfold	suprasfmes_0 suprasfmes_1 … suprasfmes_215	Method used to measure child's suprailiac skinfold at each age when child's suprailiac skinfold was recorded for suprasf_0, suprasf_1, suprasf_2 etc.	0) Measured 1) Parent/self-reported		Integer	Note any health record linkage
Child's arm length	armlength_0 armlength_1 … armlength_215	Repeated measures of child's arm length armlength_0: child's arm length measured between the ages of 0 and <1 month. armlength_1: measured between ages ≥1 and <2 months.... armlength_215: measured between ages ≥215 and <216 months		cm	Decimal	
Age when child's arm length recorded	armlengthage_0 armlengthage_1 .... armlengthage_215	Exact age of the child (in days) when child's arm length was recorded for armlength_0, armlength_1, armlength_2 etc.		days	Decimal	
Method used to measure child's arm length	armlengthmes_0 armlengthmes_1 … armlengthmes_215	Method used to measure child's arm length at each age when child's arm length was recorded for armlength_0, armlength_1, armlength_2 etc.	0) Measured 1) Parent/self-reported		Integer	Note any health record linkage

Child's sitting height	sittinght_0 sittinght_1 … sittinght_215	Repeated measures of child's sitting height sittinght_0: child's sitting height measured between the ages of 0 and <1 month. sittinght_1: measured between ages ≥1 and <2 months.... sittinght_215: measured between ages ≥215 and <216 months			cm	Decimal
Age when child's sitting height recorded	sittinghtage_0 sittinghtage_1 …. sittinghtage_215	Exact age of the child (in days) when child's sitting height was recorded for sittinght_0, sittinght_1, sittinght_2 etc.			days	Decimal
Method used to measure child's sitting height	sittinghtmes_0 sittinghtmes_1 … sittinghtmes_215	Method used to measure child's sitting height at each age when child's sitting height was recorded for sittinght_0, sittinght_1, sittinght_2 etc.	0) Measured 1) Parent/self-reported			Integer	Note any health record linkage
BLOOD Markers						
Glucose from cord blood	glucose_cord	Glucose measured in cord blood			mmol/l	Decimal
Child's glucose	glucose_0 glucose_1 … glucose_215	Repeated measures of child's glucose glucose_0: child's glucose measured between the ages of 0 and <1 month. glucose_1: measured between ages ≥1 and <2.... glucose_215: measured between ages ≥215 and <216 months			mmol/l	Decimal
Age when child's glucose recorded	glucoseage_0 glucoseage_1 …. glucoseage_215	Exact age of the child (in days) when child's glucose was recorded for glucose_0, glucose_1, glucose_2 etc.			days	Decimal
Whether child's glucose measured from fasting or nonfasting blood sample	glucosemes_0 glucosemes_1 … glucosemes_215	Whether child's glucose measured from fasting or nonfasting blood sample at each age when child's glucose was recorded for glucose_0, glucose_1, glucose_2 etc.	0) Nonfasting 1) Fasting			Integer	
Haemoglobin from cord blood	haem_cord	Haemoglobin from cord blood			mmol/l	Decimal
Child's haemoglobin	haem_0 haem_1 … haem_215	Repeated measures of child's haemoglobin haem_0: child's haemoglobin measured between the ages of 0 and <1 month. haem_1: measured between ages ≥1 and <2 months.... haem_215: measured between ages ≥215 and <216 months			mmol/l	Decimal
Age when child's haemoglobin recorded	haemage_0 haemage_1 …. haemage_215	Exact age of the child (in days) when child's haemoglobin was recorded for haem_0, haem_1, haem_2 etc.			days	Decimal

Whether child's haemoglobin measured from fasting or nonfasting blood sample	haemmes_0 haemmes_1 … haemmes_215	Whether child's haemoglobin measured from fasting or nonfasting blood sample at each age when child's haemoglobin was recorded for haem_0, haem_1, haem_2 etc.	0) Nonfasting 1) Fasting		Integer	
HbA1c from cord blood	hba1c_cord	HbA1c measured from cord blood		%	Decimal	
Child's HbA1c	hba1c_0 hba1c_1 … hba1c_215	Repeated measures of child's HbA1c hba1c_1000 HbA1c measured from cord blood hba1c_0: child's HbA1c measured between the ages of 0 and <1 month. hba1c_1: measured between ages ≥1 and <2 months.... hba1c_215: measured between ages ≥215 and <216 months		%	Decimal	
Age when child's HbA1c recorded	hba1cage_0 hba1cage_1 …. hba1cage_215	Exact age of the child (in days) when child's HbA1c was recorded for hba1c_0, hba1c_1, hba1c_2 etc.		days	Decimal	
Whether child's HbA1c measured from fasting or nonfasting blood sample	hba1cmes_0 hba1cmes_1 … hba1cmes_215	Whether child's hba1c measured from fasting or nonfasting blood sample at each age when child's hba1c was recorded for hba1c_0, hba1c_1, hba1c_2 etc.	0) Nonfasting 1) Fasting		Integer	
Insulin from cord blood	insulin_cord	Insulin measured in cord blood		mU/L	Decimal	
Child's insulin	insulin_0 insulin_1 … insulin_215	Repeated measures of child's insulin, insulin_0: child's insulin measured between the ages of 0 and <1 month. insulin_1: measured between ages ≥1 and <2 months.... insulin_215: measured between ages ≥215 and <216 months		mU/L	Decimal	
Age when child's insulin recorded	insulinage_0 insulinage_1 …. insulinage_215	Exact age of the child (in days) when child's insulin was recorded for insulin_0, insulin_1, insulin_2 etc.		days	Decimal	
Whether child's insulin measured from fasting or nonfasting blood sample	insulinmes_0 insulinmes_1 … insulinmes_215	Whether child's insulin measured from fasting or nonfasting blood sample at each age when child's insulin was recorded for insulin_0, insulin_1, insulin_2 etc.	0) Nonfasting 1) Fasting		Integer	

CRP from cord blood	crp_cord	CRP measured in cord blood		mmol/l	Decimal
Child's CRP	crp_0 crp_1 … crp_215	Repeated measures of child's CRP, crp_0: child's CRP measured between the ages of 0 and <1 month. crp_1: measured between ages ≥1 and <2 months.... crp_215: measured between ages ≥215 and <216 months		mmol/l	Decimal
Age when child's CRP recorded	crpage_0 crpage_1 …. crpage_215	Exact age of the child (in days) when child's CRP was recorded for crp_0, crp_1, crp_2 etc.		days	Decimal
Whether child's CRP measured from fasting or nonfasting blood sample	crpmes_0 crpmes_1 … crpmes_215	Whether child's CRP measured from fasting or nonfasting blood sample at each age when child's CRP was recorded for crp_0, crp_1, crp_2 etc.	0) Nonfasting 1) Fasting		Integer
IL-6 from cord blood	il6_cord	IL-6 measured in cord blood		mmol/l	Decimal
Child's IL-6	il6_0 il6_1 … il6_215	Repeated measures of child's IL-6, il6_0: child's IL-6 measured between the ages of 0 and <1 month, il6_1: measured between ages ≥1 and <2 months..... il6_215: measured between ages ≥215 and <216 months		mmol/l	Decimal
Age when child's IL-6 recorded	il6age_0 il6age_1 …. il6age_215	Exact age of the child (in days) when child's IL-6 was recorded for il6_0, il6_1, il6_2 etc.		days	Decimal
Whether child's IL-6 measured from fasting or nonfasting blood sample	il6mes_0 il6mes_1 … il6mes_215	Whether child's IL-6 measured from fasting or nonfasting blood sample at each age when child's IL-6 was recorded for il6_0, il6_1, il6_2 etc.	0) Nonfasting 1) Fasting		Integer
Adiponectin from cord blood	adipo_cord	adiponectin measured in cord blood		mmol/l	Decimal
Child's adiponectin	adipo_0 adipo_1 … adipo_215	Repeated measures of child's adiponectin adipo_0: child's adiponectin measured between the ages of 0 and <1 month. adipo_1: measured between ages ≥1 and <2 months.... adipo_215: measured between ages ≥215 and <216 months		mmol/l	Decimal
Age when child's adiponectin	adipoage_0 adipoage_1 ….	Exact age of the child (in days) when child's adiponectin was recorded for adipo_0, adipo_1, adipo_2 etc.		days	Decimal

recorded	adipoage_215					
Whether child's adiponectin measured from fasting or nonfasting blood sample	adipomes_0 adipomes_1 … adipomes_215	Whether child's adiponectin measured from fasting or nonfasting blood sample at each age when child's adiponectin was recorded for adipo_0, adipo_1, adipo_2 etc.	0) Nonfasting 1) Fasting		Integer	
Leptin from cord blood	leptin_cord	leptin measured in cord blood		mmol/l	Decimal	
Child's leptin	leptin_0 leptin_1 … leptin_215	Repeated measures of child's leptin leptin_0: child's leptin measured between the ages of 0 and <1 month. leptin_1: measured between ages ≥1 and <2 months…. leptin_215: measured between ages ≥215 and <216 months		mmol/l	Decimal	
Age when child's leptin recorded	leptinage_0 leptinage_1 …. leptinage_215	Exact age of the child (in days) when child's leptin was recorded for leptin_0, leptin_1, leptin_2 etc.		days	Decimal	
Whether child's leptin measured from fasting or nonfasting blood sample	leptinmes_0 leptinmes_1 … leptinmes_215	Whether child's leptin measured from fasting or nonfasting blood sample at each age when child's leptin was recorded for leptin_0, leptin_1, leptin_2 etc.	0) Nonfasting 1) Fasting		Integer	
total cholesterol from cord blood	chol_cord	cholesterol measured in cord blood		mmol/l	Decimal	
Child's total cholesterol	chol_0 chol_1 … chol_215	Repeated measures of child's cholesterol, chol_0: child's cholesterol measured between the ages of 0 and <1 month. cholesterol_1: measured between ages ≥1 and <2 months …. cholesterol_215: between ages ≥215 and <216 months		mmol/l	Decimal	
Age when child's total cholesterol recorded	cholage_0 cholage_1 …. cholage_215	Exact age of the child (in days) when child's cholesterol was recorded for cholesterol_0, cholesterol_1, cholesterol_2 etc.		days	Decimal	

Whether child's total cholesterol measured from fasting or nonfasting blood sample	cholmes_0 cholmes_1 ... cholmes_215	Whether child's total cholesterol measured from fasting or nonfasting blood sample at each age when child's total cholesterol was recorded for cholesterol_0, cholesterol_1, cholesterol_2 etc.	0) Nonfasting 1) Fasting		Integer	
HDLc from cord blood	hdlc_cord	HDLc measurd in cord blood		mmol/l	Decimal	
Child's HDLc	hdlc_0 hdlc_1 ... hdlc_215	Repeated measures of child's HDLc hdlc_0: child's HDLc measured between the ages of 0 and <1 month. hdlc_1: measured between ages ≥1 and <2 months.... hdlc_215: measured between ages ≥215 and <216 months		mmol/l	Decimal	
Age when child's HDLc recorded	hdlcage_0 hdlcage_1 .... hdlcage_215	Exact age of the child (in days) when child's HDLc was recorded for hdlc_0, hdlc_1, hdlc_2 etc.		days	Decimal	
Whether child's HDLc measured from fasting or nonfasting blood sample	hdlcmes_0 hdlcmes_1 ... hdlcmes_215	Whether child's HDLc measured from fasting or nonfasting blood sample at each age when child's HDLc was recorded for hdlc_0, hdlc_1, hdlc_2 etc.	0) Nonfasting 1) Fasting		Integer	
LDLc from cord blood	ldlc_cord	LDLc measured in cord blood		mmol/l	Decimal	Note if used Friedewald formula
Child's LDLc	ldlc_0 ldlc_1 ... ldlc_215	Repeated measures of child's LDLc ldlc_0: child's LDLc measured between the ages of 0 and <1 month. ldlc_1: measured between ages ≥1 and <2 months.... ldlc_215: measured between ages ≥215 and <216 months		mmol/l	Decimal	
Age when child's LDLc recorded	ldlcage_0 ldlcage_1 .... ldlcage_215	Exact age of the child (in days) when child's LDLc was recorded for ldlc_0, ldlc_1, ldlc_2 etc.		days	Decimal	
Whether child's LDLc measured from fasting or nonfasting blood sample	ldlcmes_0 ldlcmes_1 ... ldlcmes_215	Whether child's LDLc measured from fasting or nonfasting blood sample at each age when child's LDLc was recorded for ldlc_0, ldlc_1, ldlc_2 etc.	0) Nonfasting 1) Fasting		Integer	

vLDLc from cord blood	vldlc_cord	vLDLc measured in cord blood		mmol/l	Decimal	
Child's vLDLc	vldlc_0 vldlc_1 … vldlc_215	Repeated measures of child's vLDLc vldlc_0: child's vLDLc measured between the ages of 0 and <1 month. vldlc_1: measured between ages ≥1 and <2 months.... vldlc_215: measured between ages ≥215 and <216 months		mmol/l	Decimal	
Age when child's vLDLc recorded	vldlcage_0 vldlcage_1 …. vldlcage_215	Exact age of the child (in days) when child's vLDLc was recorded for vldlc_0, vldlc_1, vldlc_2 etc.		days	Decimal	
Whether child's vLDLc measured from fasting or nonfasting blood sample	vldlcmes_0 vldlcmes_1 … vldlcmes_215	Whether child's vLDLc measured from fasting or nonfasting blood sample at each age when child's vLDLc was recorded for vldlc_0,vldlc_1, vldlc_2 etc.	0) Nonfasting 1) Fasting		Integer	
Triglycerides from cord blood	triglycerides_cord	Triglycerides measured in cord blood		mmol/l	Decimal	
Child's triglycerides	triglycerides_0 triglycerides_1 … triglycerides_215	Repeated measures of child's triglycerides triglycerides_0: child's triglycerides measured between the ages of 0 and <1 month. triglycerides_1: measured between ages ≥1 and <2 months.... triglycerides_215: measured between ages ≥215 and <216 months		mmol/l	Decimal	
Age when child's triglycerides recorded	triglyceridesage_0 triglyceridesage_1 … triglyceridesage_215	Exact age of the child (in days) when child's triglycerides was recorded for triglycerides_0, triglycerides_1, triglycerides_2 etc.		days	Decimal	
Whether child's triglycerides measured from fasting or nonfasting blood sample	triglyceridesmes_0 triglyceridesmes_1 … triglyceridesmes_215	Whether child's triglycerides measured from fasting or nonfasting blood sample at each age when child's triglycerides was recorded for triglycerides_0, triglycerides_1, triglycerides_2 etc.	0) Nonfasting 1) Fasting		Integer	
CARDIOVASCULAR MEASURES						

Child's peripheral blood pressure (seated at rest from nondominant arm): 1st measurement	sbp_0 sbp_1 ... sbp_215	Repeated measures of child's systolic blood pressure (1st measurement taken) sbp_0: child's systolic blood pressure measured between the ages of 0 and <1 month. sbp_1: child's systolic blood pressure measured between the ages of ≥1 and <2 months .... sbp_215: child's systolic blood pressure measured between the ages of ≥215 and <216 months		mmHg	Decimal	
	dbp_0 dbp_1 ... dbp_215	Repeated measures of child's diastolic blood pressure (1st measurement taken) dbp_0: child's diastolic blood pressure measured between the ages of 0 and <1 month. dbp_1: child's diastolic blood pressure measured between the ages of ≥1 and <2 months .... dbp_215: child's diastolic blood pressure measured between the ages of ≥215 and <216 months		mmHg	Decimal	
Child's peripheral blood pressure: (seated at rest from nondominant arm): average	sbpav_0 sbpav_1 ... sbpav_215	Repeated measures of child's systolic blood pressure (average of multiple measures at same assessment) sbpapv_0: child's average systolic blood pressure measured between the ages of 0 and <1 month. sbpav_1: child's average systolic blood pressure measured between the ages of ≥1 and <2 months .... sbpav_215: child's average systolic blood pressure measured between the ages of ≥215 and <216 months		mmHg	Decimal	note N of repeats used to calculate average
	dbpav_0 dbpav_1 ... dbpav_215	Repeated measures of child's diastolic blood pressure (average of multiple measures at same assessment) dbpapv_0: child's average diastolic blood pressure measured between the ages of 0 and <1 month. dbpav_1: child's average diastolic blood pressure measured between the ages of ≥1 and <2 months .... dbpav_215: child's average diastolic blood pressure measured between the ages of ≥215 and <216 months		mmHg	Decimal	note N of repeats used to calculate average
Age when peripheral blood pressure recorded	bpage_0 bpage_1 .... bpage_215	Exact age of the child (in days) when child's peripheral blood pressure was recorded for sbp_0, sbp_1, dbp_0, dbp_1, sbpav_1 etc		days	Integer	
Child's pulse rate	pulse_0	Repeated measures of child's average pulse rate (if multiple		bpm	Decimal	note N of

	pulse_1 … pulse_215	measures at same assessment) pulse_0: child's pulse rate measured between the ages of 0 and <1 month. pulse_1: child's pulse rate measured between the ages of ≥1 and <2 months.... pulse_215: child's pulse rate measured between the ages of ≥215 and <216 months				repeats used to calculate average
Age when child's pulse rate recorded	pulseage_0 pulseage_1 …. pulseage_215	Exact age of the child (in days) when child's pulse rate was recorded for pulse_0, pulse_1, pulse_2 etc.		days	Decimal	
Whether child was sitting or standing when measuring pulse rate	pulsemessit_0 pulsemessit_1_ … pulsemessit_215	Whether child was sitting or standing when measuring pulse rate at each age for pulse_0 pulse_1 etc	0) Standing 1) Sitting		Integer	
Child's central (i.e. aortic) blood pressure	csbp_0 csbp_1 … csbp_215	Repeated measures of child's central (i.e. aortic) systolic blood pressure csbp_0: child's systolic blood pressure measured between the ages of 0 and <1 month. csbp_1: child's central (i.e. aortic) systolic blood pressure measured between the ages of ≥1 and <2 months.... csbp_215: child's central (i.e. aortic) systolic blood pressure measured between the ages of ≥215 and <216 months		mmHg	Decimal	use the average If >1 measure from same time & note N of repeats. Also note methods used e.g. tonometry, oscillometry
	cdbp_0 cdbp_1 … cdbp_215	Repeated measures of child's central (i.e. aortic) diastolic blood pressure cdbp_0: child's central (i.e. aortic) diastolic blood pressure measured between the ages of 0 and <1 month. cdbp_1: child's central (i.e. aortic) diastolic blood pressure measured between the ages of ≥1 and <2 months .... cdbp_215: child's central (i.e. aortic) diastolic blood pressure measured between the ages of ≥215 and <216 months		mmHg	Decimal	use the average If >1 measure from same time & note N of repeats. Also note methods used e.g. tonometry, oscillometry
Age when child's central blood pressure recorded	cbpage_0 cbpage_1 …. cbpage_215	Exact age of the child (in days) when child's central (i.e. aortic) blood pressure was recorded for csbp_0, cdbp_0, csbp_1, cdbp_1, etc.		days	Decimal	

Description	Variable	Full description	Values	Units	Type	Notes
Whether child was sitting or standing when measuring central blood pressure	cbpsit_0 cbpst_1 … cbpsit_215	Whether child was sitting or standing when measuring central blood pressure at each age for csbp_0, cdbp_0 etc	0) Standing 1) Sitting		Decimal	
Child's carotid-radial pulse wave velocity	crpwv_0 crpwv_1 … crpwv_215	Repeated measures of child's carotid-radial pulse wave velocity crpwv_0: child's carotid-radial pulse wave velocity measured between the ages of 0 and <1 month. crpwv_1: child's carotid-radial pulse wave velocity measured between the ages of ≥1 and <2 months.... crpwv_215: child's carotid-radial pulse wave velocity measured between the ages of ≥215 and <216 months		m/s	Decimal	use the average If >1 measure from same time & note N of repeats. Also note device used
Age when child's carotid-radial pulse wave velocity recorded	crpwvage_0 crpwvage_1 …. crpwvage_215	Exact age of the child (in days) when child's carotid-radial pulse wave velocity was recorded for crpwv_0, crpwv_1 etc.		days	Decimal	
Child's carotid-femoral pulse wave velocity	cfpwv_0 cfpwv_1 … cfpwv_215	Repeated measures of child's carotid-femoral pulse wave velocity cfpwv_0: child's carotid-femoral pulse wave velocity measured between the ages of 0 and <1 month. Cfpwv_1: child's carotid-femoral pulse wave velocity measured between the ages of ≥1 and <2 months.... cfpwv_215: child's carotid-femoral pulse wave velocity measured between the ages of ≥215 and <216 months		m/s	Decimal	use the average If >1 measure from same time & note N of repeats. Also note device used
Age when child's carotid-femoral pulse wave velocity recorded	cfpwvage_0 cfpwvage_1 …. cfpwvage_215	Exact age of the child (in days) when child's carotid-femoral pulse wave velocity was recorded for cfpwv_0, cfpwv_1 etc.		days	Decimal	
Child's carotid intima-media thickness	cimt_0 cimt_1 … cimt_215	Repeated measures of child's carotid intima-media thickness cimt_0: child's carotid intima-media thickness measured between the ages of 0 and <1 month. cimt_1: child's carotid intima-media thickness measured between the ages of ≥1 and <2 months.... cimt_215: child's carotid intima-media thickness measured between the ages of ≥215 and <216 months		mm	Decimal	use the average If >1 measure from same time & note N of repeats

Age when child's carotid intima-media thickness recorded	cimtage_0 cimtage_1 … cimtage_215	Exact age of the child (in days) when child's cIMT was recorded for cimt_0, cimt_0, cimt_1, cimt_1, etc.		days	Decimal	
Device used to measure child's carotid intima-media thickness	cimtmes_0 cimtmes_1 … cimtmes_215	Device used to measure child's carotid intima-media thickness at each age for cimt_0 cimt_1 etc	0) ZONARE 1) Other		Integer	Note other devices used
PREGNANCY MEASURES						Keep all pregnancy measures in wide format
Maternal peripheral blood pressure in pregnancy	m_sbp_0, m_sbp_1 … m_sbp_42	Repeated measures of mother's systolic blood pressure during pregnancy in completed weeks of gestation. m_sbp_0: mother's systolic blood pressure between 0-6 days gestation (0 completed weeks). m_sbp_1: mother's systolic blood pressure between 7-13 days gestation (1 completed week). m_sbp_42: mother's systolic blood pressure during 42nd completed week of gestation.		mmHg	Decimal	
	m_dbp_0 m_dbp_1 … m_dbp_42	Repeated measures of mother's diastolic blood pressure during pregnancy in completed weeks of gestation. m_sbp_0: mother's diastolic blood pressure between 0-6 days gestation (0 completed weeks). m_sbp_1: mother's diastolic blood pressure between 7-13 days gestation (1 completed week). m_sbp_42: mother's diastolic blood pressure during 42nd completed week of gestation.		mmHg	Decimal	
Maternal CRP	m_crp_0 m_crp_1 … m_crp_42	Repeated measures of mother's CRP during pregnancy in completed weeks of gestation. m_crp_0: mother's CRP between 0-6 days gestation (0 completed weeks). m_crp_1: mother's CRP between 7-13 days gestation (1 completed week). m_crp_42: mother's CRP during 42nd completed week of gestation.		mmol/l	Decimal	
Maternal glucose	m_glucose_0, m_glucose_1 … m_glucose_42	Repeated measures of mother's glucose during pregnancy in completed weeks of gestation m_glucose_0: mother's glucose between 0-6 days gestation (0 completed weeks). m_glucose_1: mother's glucose between 7-13 days gestation (1 completed week). m_glucose_42: mother's glucose during 42nd completed week of gestation.		mmol/l	Decimal	
Maternal haemoglobin	m_haem_0, m_haem_1 … m_haem_42	Repeated measures of mother's haemoglobin during pregnancy in completed weeks of gestation m_haem_0: mother's haemoglobin between 0-6 days gestation (0 completed weeks). m_haem_1:		mmol/l	Decimal	

		mother's haemoglobin between 7-13 days gestation (1 completed week). m_haem_42: mother's glucose during 42nd completed week of gestation.				
Maternal HbA1c	m_hba1c_0, m_hba1c_1 … m_hba1c_42	Repeated measures of mother's HbA1c during pregnancy in completed weeks of gestation m_hba1c_0: mother's HbA1c between 0-6 days gestation (0 completed weeks). m_hba1c_1: mother's HbA1c between 7-13 days gestation (1 completed week). m_hba1c_42: mother's glucose during 42nd completed week of gestation.		%	Decimal	
Maternal insulin	m_insulin_0, m_insulin_1 … m_insulin_42	Repeated measures of mother's insulin during pregnancy in completed weeks of gestation m_insulin_0: mother's insulin between 0-6 days gestation (0 completed weeks). m_insulin_1: mother's insulin between 7-13 days gestation (1 completed week). m_insulin_42: mother's insulin during 42nd completed week of gestation.		mU/L	Decimal	
Maternal HDLc	m_hdl_0, m_hdl_1 … m_hdl_42	Repeated measures of mother's HDLc during pregnancy in completed weeks of gestation m_hdl_0: mother's HDLc between 0-6 days gestation (0 completed weeks). m_hdl_1: mother's HDLc between 7-13 days gestation (1 completed week). m_hdl_42: mother's HDLc during 42nd completed week of gestation.		mmol/l	Decimal	
Maternal LDLc	m_ldl_0, m_ldl_1 … m_ldl_42	Repeated measures of mother's LDLc during pregnancy in completed weeks of gestation m_ldl_0: mother's LDLc between 0-6 days gestation (0 completed weeks). m_ldl_1: mother's LDLc between 7-13 days gestation (1 completed week). m_ldl_42: mother's LDLc during 42nd completed week of gestation.		mmol/l	Decimal	
Maternal total cholesterol	m_chol_0 m_chol_1 … m_chol_42	Repeated measures of mother's total cholesterol during pregnancy in completed weeks of gestation m_chol_0: mother's total cholesterol between 0-6 days gestation (0 completed weeks). m_chol_1: mother's total cholesterol between 7-13 days gestation (1 completed week). m_chol_42: mother's total cholesterol during 42nd completed week of gestation.		mmol/l	Decimal	
Maternal triglycerides	m_triglycerides_0, m_triglycerides_1 … m_triglycerides_42	Repeated measures of mother's triglycerides during pregnancy in completed weeks of gestation m_triglycerides_0: mother's triglycerides between 0-6 days gestation (0 completed weeks). m_triglycerides_1: mother's triglycerides between 7-13 days gestation (1 completed week). m_triglycerides_42: mother's triglycerides during 42nd completed week of gestation.		mmol/l	Decimal	
Paternal blood	f_sbp_0,	Repeated measures of father's systolic blood pressure during		mmHg	Decimal	

pressure – biological father	f_sbp_1 … f_sbp_42	pregnancy in completed weeks of gestation f_sbp_0: father's systolic blood pressure between 0-6 days gestation (0 completed weeks). f_sbp_1: father's systolic blood pressure between 7-13 days gestation (1 completed week). f_sbp_42: father's systolic blood pressure during 42nd completed week of gestation.				
	f_dbp_0 f_dbp_1 … f_dbp_42	Repeated measures of father's diastolic blood pressure during pregnancy in completed weeks of gestation f_dbp_0: father's diastolic blood pressure between 0-6 days gestation (0 completed weeks). f_dbp_1: father's diastolic blood pressure between 7-13 days gestation (1 completed week). f_dbp_42: father's diastolic blood pressure during 42nd completed week of gestation.		mmHg	Decimal	

instructions for harmonizing WP4 variables

Please use the WP4 variables harmonization table in page 5 to harmonise the WP4 variables in your cohort. A brief explanation of the harmonization table's headings is given below.

Variable name	Label/description	Values	Unit	Data Type	Further instructions
The name of the harmonised variable. This name needs to match exactly with the derived (harmonised) variable.	The description of the harmonised LifeCycle variable (matches with that provided in the online catalogue). There is no need to label variables.	Details the categories for categorical and binary variables.	Gives the units for continuous variables	The data type: decimal (continuous), and integer (binary or categorical).	Further specific instructions for harmonization including prompts to make notes on the catalogue.

When creating the harmonized variables, **if no data** exist within your cohort for a given variable at any age or at specific ages, then **skip and do not create the variable.** For example, if there is no measure of child's fat mass then don't create any fat mass variables, and if there is only one measure of the child's glucose and it was collected between 115 and <116 months, then you only need to create the variable glucose_115. Another example is if the mother's CRP in pregnancy is only available at 8 weeks gestation, then only create the variable m_crp_8.

If a cohort study has both measured and self-reported variables from the same assessment time e.g. measured and reported waist circumference between 100 and <101 months, the cohort should prioritize the measured variable or use the variable with less missing values. Alternative approaches could include using the average of the 2 or more measures.

The WP4 harmonization process largely consists renaming original variables according to the WP4 variable harmonization table. Pre-harmonization is not necessary. When harmonizing the variables, please use your judgement to use the cleanest variables available within your cohort. We are not excluding outliers but please use your knowledge of your cohort to use the cleanest variables. Please **note** the units required for the different harmonized variables e.g. **cm** for circumference measures, **mm** for skinfold thickness variables, **mmHg** for blood pressure variables. Conversion factors to harmonize the blood markers' units are discussed in the following section.

If you have any queries about harmonization of the WP4 cardiometabolic variables list please contact Ahmed Elhakeem (a.elhakeem@bristol.ac.uk) and Tim Cadman (t.cadman@bristol.ac.uk) from WP4.

instructions for harmonizing WP4 bloods marker units

According to the WP4 cardio-metabolic health variables harmonization table, the following blood markers should be harmonized to the following units:

- glucose, haemoglobin, CRP, IL6, leptin, adiponectin, triglycerides, total-, HDL-, LDL- and vLDL-cholesterol to **mmol/l**
- insulin to **mU/L**
- HbA1c to **%**

Most analytes should have relevant conversion factors to help convert quantities to the required units. For lipids, glucose and haemoglobin, conversion factors are available (see table and websites below). For CRP, IL6 and adipokines, we are currently exploring the possibility of converting units to mmol/l.

However, most cohorts should already have these markers measured in mmol/l. In addition, HbA1c should be available as % glycated haemoglobin in most cohorts. The table below contains some useful conversion factors.

Table Useful conversions for bloods

Blood marker	Formula / conversion factor
Triglycerides	1 mg/dl = 0.0113 mmol/l
Total cholesterol	1 mg/dl = 0.0259 mmol/l
HDLc	1 mg/dl = 0.0259 mmol/l
LDLc	1 mg/dl = 0.0259 mmol/l
Glucose	1 mg/dl = 0.055556 mmol/l
Insulin	1 pmol/l = 0.1 mU/l
Haemoglobin	1 g/dl = 0.6206 mmol/l

millimole/litre (mmol/l), milligram/decilitre (mg/dl), grams/decilitre (g/dl), milliunits/litre (mU/l), picomole/litre (pmol/l).

Conversion factors can be found in the following websites contain formulae:
https://www.amamanualofstyle.com/page/si-conversion-calculator
http://www.scymed.com/en/smnxpf/pfxdq210_c.htm
http://www.endmemo.com/convert/index.php
https://www.thebloodcode.com/calculators/

Quality control of harmonized WP4 variables

Please, verify that your cohort's harmonized WP4 variables completely match with the information provided in the WP4 variable harmonization table in page 5. Each cohort needs to check that the variable name, data type and units of each of the variables correspond exactly to the WP4 variable harmonization table. If any mismatch is observed, please correct the errors accordingly.

Please, generate distributions for all the harmonized variables, and check for improbable values. For variables that have been reported in publications from your cohort, verify that distributions or summary statistics of the harmonized LifeCycle variable match those of the published variables. Please, use your scientific knowledge and practical sense when making this quality check. Errors might be due to bugs in the harmonization script, so please check this carefully and correct where required.

Carry out internal validation of the variables by running correlations for continuous variables and cross-tabulate categorical variables to check for consistency. Check quality for repeated measures by checking the consistency in time bands and order. WP4 repeat measures include monthly repeat child measures and weekly repeated parental pregnancy measures. Appendix B shows an example of the R script used to carry out internal validation of the harmonised ALSPAC WP4 variables.

As part of the Quality Control, each cohort must ensure that the **Online Catalogue** tasks are completed. This means that in the Online Catalogue description of harmonization is complete and information in all three tabs ('description, 'variables used' and 'script syntax' are completed in full. Please follow Step 5 of the instructions for quality control of WP1. Please record a description of harmonization in the online catalogue where prompted for this in the WP4 variable harmonization table in page 5, e.g. the number of repeats used to calculate average values, and names of devices used to capture fat mass. Please also record a description in the online catalogue of the methods used to measure the blood markers,

including conversion factors used, and if labs that measured markers aligned to external QC for standard measurements.

Uploading harmonized WP4 variables to Opal

R script for uploading your harmonized variables to Opal are available on the LifeCycle Github website: https://github.com/lifecycle-project/analysis-protocols/tree/master/R. Please check the instructions from WP1 on uploading your harmonized WP4 variables to Opal. If you have any queries about uploading the harmonized WP4 variables to Opal please also contact Ahmed Elhakeem (a.elhakeem@bristol.ac.uk) and Tim Cadman (t.cadman@bristol.ac.uk) from WP4.

To upload your harmonized WP4 dataset, you first need to use the R script (in LifeCycle Github website) to create 3 separate long format tables containing the WP4 monthly-repeated, weekly-repeated, and non-repeated data. These tables should contain the following data:

- 1_0_monthly_rep: WP4 harmonized child's monthly-repeated cardio-metabolic variables
- 1_0_weekly_rep: WP4 harmonised weekly-repeated parental pregnancy measures
- 1_0_non_rep: WP4 harmionised cord blood variables

These three tables can then be uploaded to Opal using the script in the LifeCycle Github website .

Appendix A Inventory of data available from each cohort

Studies with at least 1 Anthropometry/body composition measure

Measure	Number of studies with ≥1 measure	Study names (number of repeat measures if >1)
Head circumference	16	ALSPAC (11), BiB (7), Generation R (12), DNBC (3), EDEN (4), HBCS (2), MoBa, NFBC1966, NFBC1986, SWS (6), RHEA (7), GECKO Drenthe (4), ELFE, NINFEA (4), CHOP (16), INMA (3)
Arm circumference	7	ALSPAC (11), BiB, SWS (7), RHEA (3), CHOP (16), INMA (2), EDEN (4)
Hip circumference	8	ALSPAC (5), Generation R, HBCS (3), NFBC1966, NFBC1986, GECKO Drenthe (4), CHOP (4), EDEN (2)
Waist circumference	13	ALSPAC (12), BiB (6), Generation R, DNBC (3), EDEN (3), NFBC1966, NFBC1986 (2), SWS (6), RHEA (2), GECKO Drenthe (7), CHOP (16), INMA (5), HBCS (3)
DXA fat and lean mass	4	ALSPAC (6), Generation R (5), CHOP (2), SWS (4)
Bioimpedence	9	ALSPAC (7), BiB, HBCS (3), NFBC1966, NFBC1986, CHOP (6), RHEA, EDEN, INMA (3)
Biceps skinfold	2	CHOP (4), Generation R (4)
Subscapular skinfold	8	ALSPAC, BiB (6), Generation R (4), CHOP (16), RHEA (3), SWS (6), EDEN (4), INMA (3)
Triceps skinfold	8	ALSPAC, BiB (6), Generation R (4), CHOP (16), RHEA (3), SWS (6), EDEN (4), INMA (3)
Suprailiac skinfold	5	ALSPAC, Generation R, CHOP (4), INMA (2), RHEA (3)
Arm length	1	ALSPAC
Sitting height	6	ALSPAC (7), SWS (6), CHOP (11), HBCS, NFBC1986, EDEN (2)

Studies with at least 1 Blood markers measure

Measure	Number of studies with ≥1 measure	Study names (number of repeats if >1)
Glucose and insulin type measures: **glucose**	6	ALSPAC (4), EDEN, HBCS (3), NFBC1966, CHOP (4), INMA
Glucose and insulin type measures: **Haemoglobin**	3	ALSPAC (13), NFBC1966 (2), CHOP (4)
Glucose and insulin type measures: **HbA1c**	6	ALSPAC (2), Generation R, HBCS, NFBC1966, GECKO Drenthe, INMA
Glucose and insulin type measures: **Insulin**	7	ALSPAC (4), BiB, Generation R, EDEN (2), HBCS (2), NFBC1966, CHOP (3)
Inflammatory markers: **CRP**	8	ALSPAC (5), BiB, HBCS (2), NFBC1966, RHEA (2), RAINE (4), CHOP (3), INMA (2)
Inflammatory markers: **IL-6**	6	ALSPAC (2), EDEN (2), HBCS, NFBC1966, RHEA (2), INMA (2)
Adipokines: **adiponectin**	9	ALSPAC (5), BiB, HBCS, NFBC1966, RHEA (2), RAINE (3), CHOP (4), INMA (2)
Adipokines: **leptin**	9	ALSPAC (4), BiB, EDEN (2), HBCS, NFBC1966, RHEA (3), RAINE (4), CHOP (4), INMA (2)
Lipids: **fatty acid profiles**	6	ALSPAC (5), Generation R, EDEN, RHEA (2), CHOP (3), INMA (2)
Lipids: **total cholesterol**	9	ALSPAC (9), BiB, Generation R, EDEN, HBCS (2), NFBC1966, RHEA (2), CHOP (3), INMA (2)
Lipids: **HDLc**	9	ALSPAC (9), BiB, Generation R, EDEN, HBCS (2), NFBC1966, RHEA (2), CHOP (3), INMA (2)
Lipids: **LDLc**	9	ALSPAC (9), BiB, EDEN, HBCS (2), NFBC1966, RHEA, RAINE, CHOP (3), INMA (2)
Lipids: **vLDLc**	4	ALSPAC (4), BiB, NFBC1966, INMA
Lipids: **triglycerides**	9	ALSPAC (9), BiB, Generation R, EDEN, HBCS (2), NFBC1966, RHEA (2), CHOP (3), INMA (2)

Studies with at least 1 cardiovascular measure

Measure	Number of studies with ≥1 measure	Study names (number of repeat measures if >1)
Peripheral blood pressure	12	ALSPAC (9), BiB (2), Generation R (3), EDEN (2), HBCS (3), NFBC1966, NFBC1986, SWS (2), RHEA (2), GECKO Drenthe (3), CHOP (7), INMA (3)
Central blood pressure (i.e. aortic)	3	ALSPAC (2), NFBC1966, SWS
Pulse rate	11	ALSPAC (9), Generation R (5), HBCS (3), NFBC1966 (2), NFBC1986, SWS (2), RHEA (2), GECKO Drenthe (3), CHOP (3), INMA, EDEN (2)
Carotid intima-media thickness	5	ALSPAC (2), Generation R, NFBC1966, SWS, CHOP (2)
Pulse wave velocity	5	ALSPAC (3), Generation R, INMA, SWS, HBCS
Fetal cardiac scans	1	Generation R
Child cardiac scans	3	ALSPAC (2), Generation R (5), NFBC1966
Flow mediated dilatation	2	ALSPAC, SWS
Distensibility	2	ALSPAC (2), SWS

Studies with at least 1 parental pregnancy measure

Measure	Number of studies with ≥1 measure	Study names and date/number of measures
Maternal blood pressure	7	ALSPAC (median=14, IQR=11-16 measures), BiB (1st, 2nd, 3rd trimesters and at labour), EDEN (24-28weeks, delivery, 5 years), HBCS (3rd trimester), NFBC1966 (1st, 3rd trimesters) NFBC1986 (1st, 2nd, 3rd trimesters), SWS (1st, 2nd, 3rd trimesters), RHEA (1st trimester), CHOP (after pregnancy: 8yrs).
Maternal CRP	2	Generation R (Prepregnancy), RHEA (1st trimester), INMA (1st trimester)
Maternal cytokines	1	RHEA (1st trimester)
Maternal glucose	5	ALSPAC (median=12, IQR=9-14 measures), BiB (2nd trimester), EDEN (2nd trimester), NFBC1986 (1st, 2nd, 3rd trimesters), RHEA (1st trimester)
Maternal haemoglobin	2	Generation R, EDEN (2nd trimester)
Maternal HbA1c	1	Generation R (3rd trimester)
Maternal insulin	3	BiB (2nd trimester), EDEN (2nd trimester), Generation R
Maternal HDLc	3	BiB (2nd trimester), EDEN (2nd trimester), RHEA (1st trimester)
Maternal LDLc	3	BiB (2nd trimester), EDEN (2nd trimester), RHEA (1st trimester)
Maternal total cholesterol	4	BiB (2nd trimester), EDEN (2nd trimester), RHEA (1st trimester), INMA (1st trimester), Generation R
Maternal triglycerides	5	BiB (2nd trimester), EDEN (2nd trimester), RHEA (1st trimester), INMA (1st trimester), Generation R (3rd trimester)
Maternal fatty acid profiles	1	Generation R, INMA (1st trimester)
Metabolomics	2	BiB (around birth?), RHEA (1st trimester), INMA (1st trimester and 3rd trimester)
Paternal blood pressure	2	NFBC1986 (during partner's pregnancy), CHOP after partner's pregnancy: 8yrs)

Appendix B ALSPAC WP4 variables internal QC

```
---
title: "WP4 QC - High Priority"
author: Tim Cadman \hspace{2em} 27th January 2020
subparagraph: true
header-includes:
- \usepackage{booktabs}
- \usepackage{longtable}
- \usepackage{array}
- \usepackage{multirow}
- \usepackage{wrapfig}
- \usepackage{colortbl}
- \usepackage{pdflscape}
- \usepackage{tabu}
- \usepackage{threeparttable}
- \usepackage{threeparttablex}
- \usepackage[normalem]{ulem}
- \usepackage{makecell}
- \usepackage{xcolor}
- \usepackage{titlesec}
- \usepackage{caption}
- \usepackage{float}
- \floatplacement{figure}{H}
- \usepackage{subcaption}
- \definecolor{customcol}{RGB}{00,56,90}
output:
 bookdown::pdf_document2:
  latex_engine: xelatex
  template: "z:/projects/ieu2/p6/048/working/scripts/common/templates/khl_4.tex"
  fig_caption: yes
  pandoc_args: --highlight-style=z:/projects/ieu2/p6/048/working/scripts/common/templates/highlight.theme
monofont: "AkzidenzGroteskBE-Light"
---


```{r prep, include=FALSE}

## ---- Load libriaries --------------------------------------------------
library(gmodels)
library(tableone)
library(tidyverse)
library(plotly)
library(kableExtra)

## ---- Get data ---------------------------------------------------------
load(file = "z:/projects/ieu2/p6/048/working/data/wp4/wp4_high.RData")

load(file = "z:/projects/ieu2/p6/048/working/data/wp4/wp4_mastdata.RData")
load(file = "z:/projects/ieu2/p6/048/working/data/wp1/wp1_chi_data.RData")

wp4_high.data <- merge(wp4_high.data, wp4.mastdata, by = c("aln", "qlet"), all.x = TRUE)
wp4_high.data <- merge(wp4_high.data, wp1_chi.data, by = c("aln", "qlet"), all.x = TRUE)

## ---- Get functions ----------------------------------------------------
source("z:/projects/ieu2/p6/048/working/scripts/common/functions/wp1-qc-functions.R")

## ---- Get theme --------------------------------------------------------
source("z:/projects/ieu2/p6/048/working/scripts/common/templates/useful-code-r-ggtheme-khl.R")

knitr::opts_chunk$set(comment = NA, echo=FALSE, tidy=FALSE, fig.pos = 'H',
                      class.output = 'r')
options(knitr.table.format = "latex")
```


```{r render, eval = FALSE}
rmarkdown::render("z:/projects/ieu2/p6/048/working/scripts/wp4/rmd/wp4-qc-high_priority.rmd",
  output_file="z:/projects/ieu2/p6/048/working/data/reports/wp4-qc-high_priority.pdf")

system2("open","z:/projects/ieu2/p6/048/working/data/reports/wp4-qc-high_priority.pdf")
```


Height measure ("heightmes_")
```

Check I've assigned the correct code based on the variable comprising the height
measure.
```{r}
height.vars <- lcVars(data = wp4_high.data, lc_prefix = "height_", inc_miss = FALSE, exclude = "age")
heightmes.vars <- lcVars(wp4_high.data, "heightmes", inc_miss = FALSE)

height_check <- data.frame(matrix(NA, ncol = 2, nrow = length(height.vars)))
height_check[, 1] <- c(
"height_4 = cf050",
"height_8 = cf051",
"height_12 = cf052",
"height_18 = cf053",
"height_25 = cf054",
"height_31 = cf055",
"height_37 = cf056",
"height_43 = cf057",
"height_49 = cf058",
"height_61 = cf059",
"height_62 = km6022",
"height_69 = kn7000",
"height_75 = kp7007",
"height_76 = kp7002",
"height_92 = f7ms010",
"height_99 = pub103",
"height_103 = f8lf020",
"height_105 = ku788",
"height_108 = ku793",
"height_110 = ku783",
"height_111 = ku798",
"height_116 = pub203",
"height_118 = f9ms010",
"height_127 = fdms010",
"height_129 = pub303",
"height_140 = fems010",
"height_141 = pub403",
"height_153 = ff2000",
"height_158 = pub503",
"height_166 = fg3100",
"height_176 = pub603",
"height_185 = fh3000",
"height_193 = pub803",
"height_202 = tc5000",
"height_204 = pub903",
"height_213 = FJMR020")

height_check[, 2] <- as.numeric(as.vector(wp4_high.data[1, heightmes.vars]))

colnames(height_check) <- c("Height harmonisation", "Height measure")

height_check %>%
kable(booktabs = TRUE,
        longtable = TRUE,
        digits = 2,
        caption = "") %>%
kable_styling(position="left",
                font_size = 11,
                latex_options = "hold_position")
```

Weight measure ("weightmes_")
Check I've assigned the correct code based on the variable comprising the weight
measure.
```{r}
weight.vars <- lcVars(wp4_high.data, "weight_", inc_miss = FALSE, exclude = "age")
weightmes.vars <- lcVars(wp4_high.data, "weightmes", inc_miss = FALSE)

weight_check <- data.frame(matrix(NA, ncol = 2, nrow = length(weight.vars) -1))
weight_check[, 1] <- c(
"weight_4 = cf040",
"weight_8 = cf041",
"weight_12 = cf042",
"weight_18 = cf043",
"weight_25 = cf044",
"weight_31 = cf045",
```

```
"weight_37 = cf046",
"weight_43 = cf047",
"weight_49 = cf048",
"weight_61 = cf049",
"weight_62 = km6021",
"weight_69 = kn7001",
"weight_75 = kp7006",
"weight_76 = kp7001",
"weight_92 = f7ms026",
"weight_99 = pub104",
"weight_103 = f8lf021",
"weight_105 = ku787",
"weight_108 = ku792",
"weight_110 = ku782",
"weight_111 = ku797",
"weight_116 = pub204",
"weight_118 = f9dx009",
"weight_127 = fdms026",
"weight_129 = pub304",
"weight_140 = fems026",
"weight_141 = pub404",
"weight_153 = ff2030 ",
"weight_158 = pub504",
"weight_166 = fg3130",
"weight_176 = pub604",
"weight_185 = fh3010",
"weight_193 = pub804",
"weight_202 = tc5001",
"weight_204 = pub904",
"weight_213 = FJMR022")

weight_check[, 2] <- as.numeric(as.vector(wp4_high.data[1, weightmes.vars]))

colnames(weight_check) <- c("Height harmonisation", "Weight measure")

weight_check %>%
kable(booktabs = TRUE,
        longtable = TRUE,
        digits = 2,
        caption = "") %>%
kable_styling(position="left",
                font_size = 11,
                latex_options = "hold_position")
```

Child's DXA fat mass - whole-body ("dxafm_")

Descriptives
```{r}
summarizeR(wp4_high.data, "dxafm_118", type = "cont")
summarizeR(wp4_high.data, "dxafm_140", type = "cont")
summarizeR(wp4_high.data, "dxafm_166", type = "cont")
summarizeR(wp4_high.data, "dxafm_185", type = "cont")
summarizeR(wp4_high.data, "dxafm_213", type = "cont")
```

Check ages are correct
```{r}
summarizeR(wp4_high.data, "dxafmage_118", type = "cont")
summarizeR(wp4_high.data, "dxafmage_140", type = "cont")
summarizeR(wp4_high.data, "dxafmage_166", type = "cont")
summarizeR(wp4_high.data, "dxafmage_185", type = "cont")
summarizeR(wp4_high.data, "dxafmage_213", type = "cont")
```

Child's DXA lean mass - whole-body ("dxalm_")

Descriptives
```{r}
summarizeR(wp4_high.data, "dxalm_118", type = "cont")
summarizeR(wp4_high.data, "dxalm_140", type = "cont")
summarizeR(wp4_high.data, "dxalm_166", type = "cont")
summarizeR(wp4_high.data, "dxalm_185", type = "cont")
summarizeR(wp4_high.data, "dxalm_213", type = "cont")
```

````
```
```

## Check ages are correct
```{r}
summarizeR(wp4_high.data, "dxalmage_118", type = "cont")
summarizeR(wp4_high.data, "dxalmage_140", type = "cont")
summarizeR(wp4_high.data, "dxalmage_166", type = "cont")
summarizeR(wp4_high.data, "dxalmage_185", type = "cont")
summarizeR(wp4_high.data, "dxalmage_213", type = "cont")
```

# Child's % body fat from bioimpedance ("bio_")

## Descriptives
```{r}
summarizeR(wp4_high.data, "bio_140", type = "cont")
summarizeR(wp4_high.data, "bio_166", type = "cont")
summarizeR(wp4_high.data, "bio_185", type = "cont")
summarizeR(wp4_high.data, "bio_213", type = "cont")
```

## Check ages are correct
```{r}
summarizeR(wp4_high.data, "bioage_140", type = "cont")
summarizeR(wp4_high.data, "bioage_166", type = "cont")
summarizeR(wp4_high.data, "bioage_185", type = "cont")
summarizeR(wp4_high.data, "bioage_213", type = "cont")
```

# Child's glucose ("glucose_")

## Descriptives
```{r}
summarizeR(wp4_high.data, "glucose_103", type = "cont")
summarizeR(wp4_high.data, "glucose_185", type = "cont")
summarizeR(wp4_high.data, "glucose_213", type = "cont")
```

## Check ages are correct
```{r}
summarizeR(wp4_high.data, "glucoseage_103", type = "cont")
summarizeR(wp4_high.data, "glucoseage_185", type = "cont")
summarizeR(wp4_high.data, "glucoseage_213", type = "cont")
```

## Check measures are coded correctly
Ages 103, 185 and 213 are fasting (= 1), all others should be 0.
```{r}
summarizeR(wp4_high.data, "glucosemes_103", type = "cat")
summarizeR(wp4_high.data, "glucosemes_185", type = "cat")
summarizeR(wp4_high.data, "glucosemes_213", type = "cat")
```

# Child's haemoglobin ("haem_")

## Descriptives
```{r}
summarizeR(wp4_high.data, "haem_8", type = "cont")
summarizeR(wp4_high.data, "haem_12", type = "cont")
summarizeR(wp4_high.data, "haem_18", type = "cont")
summarizeR(wp4_high.data, "haem_31", type = "cont")
summarizeR(wp4_high.data, "haem_43", type = "cont")
summarizeR(wp4_high.data, "haem_61", type = "cont")
summarizeR(wp4_high.data, "haem_92", type = "cont")
summarizeR(wp4_high.data, "haem_118", type = "cont")
summarizeR(wp4_high.data, "haem_140", type = "cont")
summarizeR(wp4_high.data, "haem_166", type = "cont")
summarizeR(wp4_high.data, "haem_185", type = "cont")
summarizeR(wp4_high.data, "haem_213", type = "cont")
```

## Check ages are correct
```{r}
summarizeR(wp4_high.data, "haemage_8", type = "cont")
````

```r
summarizeR(wp4_high.data, "haemage_12", type = "cont")
summarizeR(wp4_high.data, "haemage_18", type = "cont")
summarizeR(wp4_high.data, "haemage_31", type = "cont")
summarizeR(wp4_high.data, "haemage_43", type = "cont")
summarizeR(wp4_high.data, "haemage_61", type = "cont")
summarizeR(wp4_high.data, "haemage_92", type = "cont")
summarizeR(wp4_high.data, "haemage_118", type = "cont")
summarizeR(wp4_high.data, "haemage_140", type = "cont")
summarizeR(wp4_high.data, "haemage_166", type = "cont")
summarizeR(wp4_high.data, "haemage_185", type = "cont")
summarizeR(wp4_high.data, "haemage_213", type = "cont")
```

Check measures are coded correctly
Ages 103, 185 and 213 are fasting (= 1), all others should be 0.
```{r}
summarizeR(wp4_high.data, "haemmes_8", type = "cat")
summarizeR(wp4_high.data, "haemmes_12", type = "cat")
summarizeR(wp4_high.data, "haemmes_18", type = "cat")
summarizeR(wp4_high.data, "haemmes_31", type = "cat")
summarizeR(wp4_high.data, "haemmes_43", type = "cat")
summarizeR(wp4_high.data, "haemmes_61", type = "cat")
summarizeR(wp4_high.data, "haemmes_92", type = "cat")
summarizeR(wp4_high.data, "haemmes_118", type = "cat")
summarizeR(wp4_high.data, "haemmes_140", type = "cat")
summarizeR(wp4_high.data, "haemmes_166", type = "cat")
summarizeR(wp4_high.data, "haemmes_185", type = "cat")
summarizeR(wp4_high.data, "haemmes_213", type = "cat")
```

Child's HBA1C ("hba1c_")

Descriptives
```{r}
summarizeR(wp4_high.data, "hba1c_118", type = "cont")
```

Check ages are correct
```{r}
summarizeR(wp4_high.data, "hba1cage_118", type = "cont")
```

Check measures are coded correctly
Ages 103, 185 and 213 are fasting (= 1), all others should be 0.
```{r}
summarizeR(wp4_high.data, "hba1cmes_118", type = "cat")
```

Child's insulin ("insulin_")

Descriptives
```{r}
summarizeR(wp4_high.data, "insulin_cord", type = "cont", digits = 9)
summarizeR(wp4_high.data, "insulin_103", type = "cont", digits = 9)
summarizeR(wp4_high.data, "insulin_118", type = "cont", digits = 9)
summarizeR(wp4_high.data, "insulin_185", type = "cont", digits = 9)
summarizeR(wp4_high.data, "insulin_213", type = "cont", digits = 9)
```

Check ages are correct
```{r}
summarizeR(wp4_high.data, "insulinage_103", type = "cont")
summarizeR(wp4_high.data, "insulinage_118", type = "cont")
summarizeR(wp4_high.data, "insulinage_185", type = "cont")
summarizeR(wp4_high.data, "insulinage_213", type = "cont")
```

Check measures are coded correctly
Ages 103, 185 and 213 are fasting (= 1), all others should be 0.
```{r}
summarizeR(wp4_high.data, "insulinmes_103", type = "cat")
summarizeR(wp4_high.data, "insulinmes_118", type = "cat")
summarizeR(wp4_high.data, "insulinmes_185", type = "cat")
summarizeR(wp4_high.data, "insulinmes_213", type = "cat")
```

```
```

Child's CRP ("crp_")

Descriptives
```{r}
summarizeR(wp4_high.data, "crp_cord", type = "cont", digits = 9)
summarizeR(wp4_high.data, "crp_118", type = "cont", digits = 9)
summarizeR(wp4_high.data, "crp_185", type = "cont", digits = 9)
summarizeR(wp4_high.data, "crp_213", type = "cont", digits = 9)
```

Check ages are correct
```{r}
summarizeR(wp4_high.data, "crpage_118", type = "cont")
summarizeR(wp4_high.data, "crpage_185", type = "cont")
summarizeR(wp4_high.data, "crpage_213", type = "cont")
```

Check measures are coded correctly
Ages 103, 185 and 213 are fasting (= 1), all others should be 0.
```{r}
summarizeR(wp4_high.data, "crpmes_118", type = "cat")
summarizeR(wp4_high.data, "crpmes_185", type = "cat")
summarizeR(wp4_high.data, "crpmes_213", type = "cat")
```

Child's IL6 ("il6_")

Descriptives
```{r}
summarizeR(wp4_high.data, "il6_118", type = "cont", digits = 9)
```

Check ages are correct
```{r}
summarizeR(wp4_high.data, "il6age_118", type = "cont")
```

Check measures are coded correctly
Ages 103, 185 and 213 are fasting (= 1), all others should be 0.
```{r}
summarizeR(wp4_high.data, "il6mes_118", type = "cat")
```

Child's Adiponectin ("adipo_")

Descriptives
```{r}
summarizeR(wp4_high.data, "adipo_cord", type = "cont", digits = 9)
summarizeR(wp4_high.data, "adipo_118", type = "cont", digits = 9)
summarizeR(wp4_high.data, "adipo_185", type = "cont", digits = 9)
```

Check ages are correct
```{r}
summarizeR(wp4_high.data, "adipoage_118", type = "cont")
summarizeR(wp4_high.data, "adipoage_185", type = "cont")
```

Check measures are coded correctly
Ages 103, 185 and 213 are fasting (= 1), all others should be 0.
```{r}
summarizeR(wp4_high.data, "adipomes_118", type = "cat")
summarizeR(wp4_high.data, "adipomes_185", type = "cat")
```

Child's leptin ("leptin_")

Descriptives
```{r}
summarizeR(wp4_high.data, "leptin_cord", type = "cont", digits = 9)
summarizeR(wp4_high.data, "leptin_61", type = "cont", digits = 9)
```

```
summarizeR(wp4_high.data, "leptin_103", type = "cont", digits = 9)
summarizeR(wp4_high.data, "leptin_118", type = "cont", digits = 9)
```

Check ages are correct
```{r}
summarizeR(wp4_high.data, "leptinage_61", type = "cont")
summarizeR(wp4_high.data, "leptinage_103", type = "cont")
summarizeR(wp4_high.data, "leptinage_118", type = "cont")
```

Check measures are coded correctly
Ages 103, 185 and 213 are fasting (= 1), all others should be 0.
```{r}
summarizeR(wp4_high.data, "leptinmes_61", type = "cat")
summarizeR(wp4_high.data, "leptinmes_103", type = "cat")
summarizeR(wp4_high.data, "leptinmes_118", type = "cat")
```

Child's fatty acids ("fattyacids_")

Descriptives
```{r}
summarizeR(wp4_high.data, "fattyacids_cord", type = "cont", digits = 9)
summarizeR(wp4_high.data, "fattyacids_92", type = "cont", digits = 9)
```

Check ages are correct
```{r}
summarizeR(wp4_high.data, "fattyacidsage_92", type = "cont")
```

Check measures are coded correctly
Ages 103, 185 and 213 are fasting (= 1), all others should be 0.
```{r}
summarizeR(wp4_high.data, "fattyacidsmes_92", type = "cat")
```

Child's cholesterol ("chol_")

Descriptives
```{r}
summarizeR(wp4_high.data, "chol_cord.y", type = "cont")
summarizeR(wp4_high.data, "chol_31", type = "cont")
summarizeR(wp4_high.data, "chol_43", type = "cont")
summarizeR(wp4_high.data, "chol_92", type = "cont")
summarizeR(wp4_high.data, "chol_103", type = "cont")
summarizeR(wp4_high.data, "chol_118", type = "cont")
summarizeR(wp4_high.data, "chol_185", type = "cont")
summarizeR(wp4_high.data, "chol_213", type = "cont")
```

Check ages are correct
```{r}
summarizeR(wp4_high.data, "cholage_31", type = "cont")
summarizeR(wp4_high.data, "cholage_43", type = "cont")
summarizeR(wp4_high.data, "cholage_92", type = "cont")
summarizeR(wp4_high.data, "cholage_103", type = "cont")
summarizeR(wp4_high.data, "cholage_118", type = "cont")
summarizeR(wp4_high.data, "cholage_185", type = "cont")
summarizeR(wp4_high.data, "cholage_213", type = "cont")
```

Check measures are coded correctly
Ages 103, 185 and 213 are fasting (= 1), all others should be 0.
```{r}
summarizeR(wp4_high.data, "cholmes_31", type = "cat")
summarizeR(wp4_high.data, "cholmes_43", type = "cat")
summarizeR(wp4_high.data, "cholmes_92", type = "cat")
summarizeR(wp4_high.data, "cholmes_103", type = "cat")
summarizeR(wp4_high.data, "cholmes_118", type = "cat")
summarizeR(wp4_high.data, "cholmes_185", type = "cat")
summarizeR(wp4_high.data, "cholmes_213", type = "cat")
```

Child's HDLc ("hdlc_")

Descriptives
```{r}
summarizeR(wp4_high.data, "hdlc_cord", type = "cont")
summarizeR(wp4_high.data, "hdlc_31", type = "cont")
summarizeR(wp4_high.data, "hdlc_43", type = "cont")
summarizeR(wp4_high.data, "hdlc_92", type = "cont")
summarizeR(wp4_high.data, "hdlc_103", type = "cont")
summarizeR(wp4_high.data, "hdlc_118", type = "cont")
summarizeR(wp4_high.data, "hdlc_185", type = "cont")
summarizeR(wp4_high.data, "hdlc_213", type = "cont")
```

Check ages are correct
```{r}
summarizeR(wp4_high.data, "hdlcage_31", type = "cont")
summarizeR(wp4_high.data, "hdlcage_43", type = "cont")
summarizeR(wp4_high.data, "hdlcage_92", type = "cont")
summarizeR(wp4_high.data, "hdlcage_103", type = "cont")
summarizeR(wp4_high.data, "hdlcage_118", type = "cont")
summarizeR(wp4_high.data, "hdlcage_185", type = "cont")
summarizeR(wp4_high.data, "hdlcage_213", type = "cont")
```

Check measures are coded correctly
Ages 103, 185 and 213 are fasting (= 1), all others should be 0.
```{r}
summarizeR(wp4_high.data, "hdlcmes_31", type = "cat")
summarizeR(wp4_high.data, "hdlcmes_43", type = "cat")
summarizeR(wp4_high.data, "hdlcmes_92", type = "cat")
summarizeR(wp4_high.data, "hdlcmes_103", type = "cat")
summarizeR(wp4_high.data, "hdlcmes_118", type = "cat")
summarizeR(wp4_high.data, "hdlcmes_185", type = "cat")
summarizeR(wp4_high.data, "hdlcmes_213", type = "cat")
```

Child's LDLc ("ldlc_")

Descriptives
```{r}
summarizeR(wp4_high.data, "ldlc_cord", type = "cont")
summarizeR(wp4_high.data, "ldlc_31", type = "cont")
summarizeR(wp4_high.data, "ldlc_43", type = "cont")
summarizeR(wp4_high.data, "ldlc_92", type = "cont")
summarizeR(wp4_high.data, "ldlc_103", type = "cont")
summarizeR(wp4_high.data, "ldlc_118", type = "cont")
summarizeR(wp4_high.data, "ldlc_185", type = "cont")
summarizeR(wp4_high.data, "ldlc_213", type = "cont")
```

Check ages are correct
```{r}
summarizeR(wp4_high.data, "ldlcage_31", type = "cont")
summarizeR(wp4_high.data, "ldlcage_43", type = "cont")
summarizeR(wp4_high.data, "ldlcage_92", type = "cont")
summarizeR(wp4_high.data, "ldlcage_103", type = "cont")
summarizeR(wp4_high.data, "ldlcage_118", type = "cont")
summarizeR(wp4_high.data, "ldlcage_185", type = "cont")
summarizeR(wp4_high.data, "ldlcage_213", type = "cont")
```

Check measures are coded correctly
Ages 103, 185 and 213 are fasting (= 1), all others should be 0.
```{r}
summarizeR(wp4_high.data, "ldlcmes_31", type = "cat")
summarizeR(wp4_high.data, "ldlcmes_43", type = "cat")
summarizeR(wp4_high.data, "ldlcmes_92", type = "cat")
summarizeR(wp4_high.data, "ldlcmes_103", type = "cat")
summarizeR(wp4_high.data, "ldlcmes_118", type = "cat")
summarizeR(wp4_high.data, "ldlcmes_185", type = "cat")
summarizeR(wp4_high.data, "ldlcmes_213", type = "cat")
```

```
```

```
# Child's vLDLc ("vldlc")

## Descriptives
```{r}
summarizeR(wp4_high.data, "vldlc_118", type = "cont")
summarizeR(wp4_high.data, "vldlc_185", type = "cont")
summarizeR(wp4_high.data, "vldlc_213", type = "cont")
```

Check ages are correct
```{r}
summarizeR(wp4_high.data, "vldlcage_118", type = "cont")
summarizeR(wp4_high.data, "vldlcage_185", type = "cont")
summarizeR(wp4_high.data, "vldlcage_213", type = "cont")
```

Check measures are coded correctly
Ages 103, 185 and 213 are fasting (= 1), all others should be 0.
```{r}
summarizeR(wp4_high.data, "vldlcmes_118", type = "cat")
summarizeR(wp4_high.data, "vldlcmes_185", type = "cat")
summarizeR(wp4_high.data, "vldlcmes_213", type = "cat")
```

Child's Triglycerides ("triglycerides_")

Descriptives
```{r}
summarizeR(wp4_high.data, "triglycerides_cord", type = "cont")
summarizeR(wp4_high.data, "triglycerides_31", type = "cont")
summarizeR(wp4_high.data, "triglycerides_43", type = "cont")
summarizeR(wp4_high.data, "triglycerides_92", type = "cont")
summarizeR(wp4_high.data, "triglycerides_103", type = "cont")
summarizeR(wp4_high.data, "triglycerides_118", type = "cont")
summarizeR(wp4_high.data, "triglycerides_185", type = "cont")
summarizeR(wp4_high.data, "triglycerides_213", type = "cont")
```

Check ages are correct
```{r}
summarizeR(wp4_high.data, "triglyceridesage_31", type = "cont")
summarizeR(wp4_high.data, "triglyceridesage_43", type = "cont")
summarizeR(wp4_high.data, "triglyceridesage_92", type = "cont")
summarizeR(wp4_high.data, "triglyceridesage_103", type = "cont")
summarizeR(wp4_high.data, "triglyceridesage_118", type = "cont")
summarizeR(wp4_high.data, "triglyceridesage_185", type = "cont")
summarizeR(wp4_high.data, "triglyceridesage_213", type = "cont")
```

Check measures are coded correctly
Ages 103, 185 and 213 are fasting (= 1), all others should be 0.
```{r}
summarizeR(wp4_high.data, "triglyceridesmes_31", type = "cat")
summarizeR(wp4_high.data, "triglyceridesmes_43", type = "cat")
summarizeR(wp4_high.data, "triglyceridesmes_92", type = "cat")
summarizeR(wp4_high.data, "triglyceridesmes_103", type = "cat")
summarizeR(wp4_high.data, "triglyceridesmes_118", type = "cat")
summarizeR(wp4_high.data, "triglyceridesmes_185", type = "cat")
summarizeR(wp4_high.data, "triglyceridesmes_213", type = "cont")
```

Child's systolic blood pressure ("spb_")

Single measurement descriptives
```{r}
summarizeR(wp4_high.data, "sbp_37", type = "cont")
summarizeR(wp4_high.data, "sbp_49", type = "cont")
summarizeR(wp4_high.data, "sbp_61", type = "cont")
summarizeR(wp4_high.data, "sbp_92", type = "cont")
summarizeR(wp4_high.data, "sbp_118", type = "cont")
summarizeR(wp4_high.data, "sbp_140", type = "cont")
```

```
summarizeR(wp4_high.data, "sbp_153", type = "cont")
summarizeR(wp4_high.data, "sbp_166", type = "cont")
summarizeR(wp4_high.data, "sbp_185", type = "cont")
summarizeR(wp4_high.data, "sbp_213", type = "cont")
```

Average of two measurements descriptives
```{r}
summarizeR(wp4_high.data, "sbpav_37", type = "cont")
summarizeR(wp4_high.data, "sbpav_49", type = "cont")
summarizeR(wp4_high.data, "sbpav_61", type = "cont")
summarizeR(wp4_high.data, "sbpav_92", type = "cont")
summarizeR(wp4_high.data, "sbpav_118", type = "cont")
summarizeR(wp4_high.data, "sbpav_140", type = "cont")
summarizeR(wp4_high.data, "sbpav_153", type = "cont")
summarizeR(wp4_high.data, "sbpav_166", type = "cont")
summarizeR(wp4_high.data, "sbpav_185", type = "cont")
summarizeR(wp4_high.data, "sbpav_213", type = "cont")
```

Child's diastolic blood pressure ("dpb_")

Single measurement descriptives
```{r}
summarizeR(wp4_high.data, "dbp_37", type = "cont")
summarizeR(wp4_high.data, "dbp_49", type = "cont")
summarizeR(wp4_high.data, "dbp_61", type = "cont")
summarizeR(wp4_high.data, "dbp_92", type = "cont")
summarizeR(wp4_high.data, "dbp_118", type = "cont")
summarizeR(wp4_high.data, "dbp_140", type = "cont")
summarizeR(wp4_high.data, "dbp_153", type = "cont")
summarizeR(wp4_high.data, "dbp_166", type = "cont")
summarizeR(wp4_high.data, "dbp_185", type = "cont")
summarizeR(wp4_high.data, "dbp_213", type = "cont")
```

Average of two measurements descriptives
```{r}
summarizeR(wp4_high.data, "dbpav_37", type = "cont")
summarizeR(wp4_high.data, "dbpav_49", type = "cont")
summarizeR(wp4_high.data, "dbpav_61", type = "cont")
summarizeR(wp4_high.data, "dbpav_92", type = "cont")
summarizeR(wp4_high.data, "dbpav_118", type = "cont")
summarizeR(wp4_high.data, "dbpav_140", type = "cont")
summarizeR(wp4_high.data, "dbpav_153", type = "cont")
summarizeR(wp4_high.data, "dbpav_166", type = "cont")
summarizeR(wp4_high.data, "dbpav_185", type = "cont")
summarizeR(wp4_high.data, "dbpav_213", type = "cont")
```

Age of blood pressure measurements
```{r}
summarizeR(wp4_high.data, "bpage_37", type = "cont")
summarizeR(wp4_high.data, "bpage_49", type = "cont")
summarizeR(wp4_high.data, "bpage_61", type = "cont")
summarizeR(wp4_high.data, "bpage_92", type = "cont")
summarizeR(wp4_high.data, "bpage_118", type = "cont")
summarizeR(wp4_high.data, "bpage_140", type = "cont")
summarizeR(wp4_high.data, "bpage_153", type = "cont")
summarizeR(wp4_high.data, "bpage_166", type = "cont")
summarizeR(wp4_high.data, "bpage_185", type = "cont")
summarizeR(wp4_high.data, "bpage_213", type = "cont")
```

Child's pulse rate ("pulse_")

Descriptives
```{r}
summarizeR(wp4_high.data, "pulse_37", type = "cont")
summarizeR(wp4_high.data, "pulse_49", type = "cont")
summarizeR(wp4_high.data, "pulse_61", type = "cont")
summarizeR(wp4_high.data, "pulse_92", type = "cont")
summarizeR(wp4_high.data, "pulse_118", type = "cont")
summarizeR(wp4_high.data, "pulse_140", type = "cont")
```

```
summarizeR(wp4_high.data, "pulse_153", type = "cont")
summarizeR(wp4_high.data, "pulse_166", type = "cont")
summarizeR(wp4_high.data, "pulse_185", type = "cont")
summarizeR(wp4_high.data, "pulse_213", type = "cont")
```

Check ages are correct
```{r}
summarizeR(wp4_high.data, "pulseage_37", type = "cont")
summarizeR(wp4_high.data, "pulseage_49", type = "cont")
summarizeR(wp4_high.data, "pulseage_61", type = "cont")
summarizeR(wp4_high.data, "pulseage_92", type = "cont")
summarizeR(wp4_high.data, "pulseage_118", type = "cont")
summarizeR(wp4_high.data, "pulseage_140", type = "cont")
summarizeR(wp4_high.data, "pulseage_153", type = "cont")
summarizeR(wp4_high.data, "pulseage_166", type = "cont")
summarizeR(wp4_high.data, "pulseage_185", type = "cont")
summarizeR(wp4_high.data, "pulseage_213", type = "cont")
```

Maternal systolic blood pressure in pregnancy ("m_sbp_")
```{r}
summarizeR(wp4_high.data, "m_sbp_1", type = "cont")
summarizeR(wp4_high.data, "m_sbp_2", type = "cont")
summarizeR(wp4_high.data, "m_sbp_3", type = "cont")
summarizeR(wp4_high.data, "m_sbp_4", type = "cont")
summarizeR(wp4_high.data, "m_sbp_5", type = "cont")
summarizeR(wp4_high.data, "m_sbp_6", type = "cont")
summarizeR(wp4_high.data, "m_sbp_7", type = "cont")
summarizeR(wp4_high.data, "m_sbp_8", type = "cont")
summarizeR(wp4_high.data, "m_sbp_9", type = "cont")
summarizeR(wp4_high.data, "m_sbp_10", type = "cont")
summarizeR(wp4_high.data, "m_sbp_11", type = "cont")
summarizeR(wp4_high.data, "m_sbp_12", type = "cont")
summarizeR(wp4_high.data, "m_sbp_13", type = "cont")
summarizeR(wp4_high.data, "m_sbp_14", type = "cont")
summarizeR(wp4_high.data, "m_sbp_15", type = "cont")
summarizeR(wp4_high.data, "m_sbp_16", type = "cont")
summarizeR(wp4_high.data, "m_sbp_17", type = "cont")
summarizeR(wp4_high.data, "m_sbp_18", type = "cont")
summarizeR(wp4_high.data, "m_sbp_19", type = "cont")
summarizeR(wp4_high.data, "m_sbp_20", type = "cont")
summarizeR(wp4_high.data, "m_sbp_21", type = "cont")
summarizeR(wp4_high.data, "m_sbp_22", type = "cont")
summarizeR(wp4_high.data, "m_sbp_23", type = "cont")
summarizeR(wp4_high.data, "m_sbp_24", type = "cont")
summarizeR(wp4_high.data, "m_sbp_25", type = "cont")
summarizeR(wp4_high.data, "m_sbp_26", type = "cont")
summarizeR(wp4_high.data, "m_sbp_27", type = "cont")
summarizeR(wp4_high.data, "m_sbp_28", type = "cont")
summarizeR(wp4_high.data, "m_sbp_29", type = "cont")
summarizeR(wp4_high.data, "m_sbp_30", type = "cont")
summarizeR(wp4_high.data, "m_sbp_31", type = "cont")
summarizeR(wp4_high.data, "m_sbp_32", type = "cont")
summarizeR(wp4_high.data, "m_sbp_33", type = "cont")
summarizeR(wp4_high.data, "m_sbp_34", type = "cont")
summarizeR(wp4_high.data, "m_sbp_35", type = "cont")
summarizeR(wp4_high.data, "m_sbp_36", type = "cont")
summarizeR(wp4_high.data, "m_sbp_37", type = "cont")
summarizeR(wp4_high.data, "m_sbp_38", type = "cont")
summarizeR(wp4_high.data, "m_sbp_39", type = "cont")
summarizeR(wp4_high.data, "m_sbp_40", type = "cont")
summarizeR(wp4_high.data, "m_sbp_41", type = "cont")
summarizeR(wp4_high.data, "m_sbp_42", type = "cont")
summarizeR(wp4_high.data, "m_sbp_43", type = "cont")
summarizeR(wp4_high.data, "m_sbp_44", type = "cont")
summarizeR(wp4_high.data, "m_sbp_45", type = "cont")
summarizeR(wp4_high.data, "m_sbp_46", type = "cont")
summarizeR(wp4_high.data, "m_sbp_47", type = "cont")
summarizeR(wp4_high.data, "m_sbp_48", type = "cont")
summarizeR(wp4_high.data, "m_sbp_49", type = "cont")
```

Maternal diastolic blood pressure in pregnancy ("m_dbp_")

```{r}
summarizeR(wp4_high.data, "m_dbp_1", type = "cont")
summarizeR(wp4_high.data, "m_dbp_2", type = "cont")
summarizeR(wp4_high.data, "m_dbp_3", type = "cont")
summarizeR(wp4_high.data, "m_dbp_4", type = "cont")
summarizeR(wp4_high.data, "m_dbp_5", type = "cont")
summarizeR(wp4_high.data, "m_dbp_6", type = "cont")
summarizeR(wp4_high.data, "m_dbp_7", type = "cont")
summarizeR(wp4_high.data, "m_dbp_8", type = "cont")
summarizeR(wp4_high.data, "m_dbp_9", type = "cont")
summarizeR(wp4_high.data, "m_dbp_10", type = "cont")
summarizeR(wp4_high.data, "m_dbp_11", type = "cont")
summarizeR(wp4_high.data, "m_dbp_12", type = "cont")
summarizeR(wp4_high.data, "m_dbp_13", type = "cont")
summarizeR(wp4_high.data, "m_dbp_14", type = "cont")
summarizeR(wp4_high.data, "m_dbp_15", type = "cont")
summarizeR(wp4_high.data, "m_dbp_16", type = "cont")
summarizeR(wp4_high.data, "m_dbp_17", type = "cont")
summarizeR(wp4_high.data, "m_dbp_18", type = "cont")
summarizeR(wp4_high.data, "m_dbp_19", type = "cont")
summarizeR(wp4_high.data, "m_dbp_20", type = "cont")
summarizeR(wp4_high.data, "m_dbp_21", type = "cont")
summarizeR(wp4_high.data, "m_dbp_22", type = "cont")
summarizeR(wp4_high.data, "m_dbp_23", type = "cont")
summarizeR(wp4_high.data, "m_dbp_24", type = "cont")
summarizeR(wp4_high.data, "m_dbp_25", type = "cont")
summarizeR(wp4_high.data, "m_dbp_26", type = "cont")
summarizeR(wp4_high.data, "m_dbp_27", type = "cont")
summarizeR(wp4_high.data, "m_dbp_28", type = "cont")
summarizeR(wp4_high.data, "m_dbp_29", type = "cont")
summarizeR(wp4_high.data, "m_dbp_30", type = "cont")
summarizeR(wp4_high.data, "m_dbp_31", type = "cont")
summarizeR(wp4_high.data, "m_dbp_32", type = "cont")
summarizeR(wp4_high.data, "m_dbp_33", type = "cont")
summarizeR(wp4_high.data, "m_dbp_34", type = "cont")
summarizeR(wp4_high.data, "m_dbp_35", type = "cont")
summarizeR(wp4_high.data, "m_dbp_36", type = "cont")
summarizeR(wp4_high.data, "m_dbp_37", type = "cont")
summarizeR(wp4_high.data, "m_dbp_38", type = "cont")
summarizeR(wp4_high.data, "m_dbp_39", type = "cont")
summarizeR(wp4_high.data, "m_dbp_40", type = "cont")
summarizeR(wp4_high.data, "m_dbp_41", type = "cont")
summarizeR(wp4_high.data, "m_dbp_42", type = "cont")
summarizeR(wp4_high.data, "m_dbp_43", type = "cont")
summarizeR(wp4_high.data, "m_dbp_44", type = "cont")
summarizeR(wp4_high.data, "m_dbp_45", type = "cont")
summarizeR(wp4_high.data, "m_dbp_46", type = "cont")
summarizeR(wp4_high.data, "m_dbp_47", type = "cont")
summarizeR(wp4_high.data, "m_dbp_48", type = "cont")
summarizeR(wp4_high.data, "m_dbp_49", type = "cont")
```