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Supplemental Material

Prenatal Exposure to Per- and Polyfluoroalkyl Substances and Child Growth Trajectories in the First Two Years

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Table S1. Distribution of selected characteristics in the source population and the study population in Shanghai Birth Cohort, Shanghai, China, recruited from 2013 to 2016.

Selected characteristics	Source population (N=3078)	Study population (n=1350)
Maternal age (year)		
<25	203 (7.1)	99 (7.3)
25-29	1461 (51.0)	717 (53.2)
30-34	920 (32.1)	406 (30.1)
≥35	279 (9.7)	126 (9.3)
Missing	215	2
Maternal education		
High school or less	302 (9.9)	147 (10.9)
Associate or bachelor	2380 (77.7)	1074 (79.7)
Graduate	380 (12.4)	126 (9.4)
Missing	16	3
Parity		
Nulliparous	2566 (83.4)	1151 (85.3)
Multiparous	512 (16.6)	199 (14.7)
Active or passive smoking during pregnancy		
No	1879 (64.8)	845 (63.1)
Yes	1020 (35.2)	494 (36.9)
Missing	179	11
Pre-pregnancy BMI		
<18.5	445 (14.8)	208 (15.6)
18.5-24.9	2244 (74.5)	981 (73.4)
≥25	322 (10.7)	148 (11.1)
Missing	67	13
Fish or seafood intake during pregnancy		
No	118 (4.2)	53 (4.0)
<1 /week	333 (11.9)	148 (11.3)
1-3 /week	1946 (69.5)	917 (69.7)
4-7 /week	381 (13.6)	186 (14.1)
>7 /week	23 (0.8)	11 (0.8)
Missing	277	35
Gestational weight gain (kg)		
<12	682 (25.1)	327 (25.4)
12-14.9	675 (24.9)	319 (24.8)
15-17.9	651 (24.0)	323 (25.1)
≥18	707 (26.0)	319 (24.8)
Missing	363	62
Breastfeeding after birth		
No	75 (2.9)	40 (3.0)
Yes, less than 6 months	773 (29.4)	350 (25.9)
Yes, more than 6 months	1782 (67.8)	960 (71.1)
Missing	448	0
Delivery method		
Vaginal delivery	1924 (62.5)	770 (57.0)
Cesarean delivery	1154 (37.5)	580 (43.0)
Child sex		
Female	1327 (48.7)	644 (47.7)
Male	1396 (51.3)	706 (52.3)
Missing	355	0
Pregnancy eGFR (mL/min/1.73m^2)[a]	157.7 (139.2-182.5)	157.8(139.0-183.1)

Note: SBC: Shanghai Birth Cohort; eGFR: estimated glomerular filtration rate. [a] Median (inter-quartile range).

Table S2. Anthropometric measures in children at 3days, 42 days, 6 months, 12 months and 24 months in Shanghai Birth Cohort, Shanghai, China, recruited from 2013 to 2016.

	Mean (SD)				
	At birth	42 days	6 months	12 months	24 months
Weight					
N	2266	2128	1841	1928	1947
Original value (kg)	3.38 (0.44)	5.14 (0.62)	8.61 (1.02)	10.26 (1.14)	12.87 (1.44)
z score*	0.13 (0.92)	0.55 (0.92)	0.82 (0.97)	0.74 (0.91)	0.66 (0.89)
Length/height					
N	1882	2065	1836	1927	1945
Original value (cm)	49.92 (1.19)	56.74 (2.28)	68.65 (2.64)	76.18 (2.60)	88.66 (3.25)
z score*	-0.07 (0.65)	0.54 (1.13)	0.55 (1.08)	0.42 (1.01)	0.57 (1.00)
Weight-for-length					
N	1873	2061	1836	1922	1943
z score*	0.12 (1.15)	0.20 (1.20)	0.78 (1.01)	0.75 (0.96)	0.46 (0.96)
Head circumference					
N	1900	2047	1816	1892	1790
Original value (cm)	34.36 (1.18)	37.91 (1.17)	43.50 (1.35)	45.90 (1.35)	48.36 (1.33)
z score*	-0.10 (0.97)	0.20 (0.95)	0.34 (0.96)	0.26 (0.95)	0.46 (0.92)

* The z score was calculated based on child growth standards from World Health Organization.

Table S3. Definitions for five trajectory groups for each anthropometrical measure in Shanghai Birth Cohort, Shanghai, China, recruited from 2013 to 2016.

	Trajectory groups				
Weight-for-age z score (WAZ)	**High-rising** Initial value: z = 0.85 At the end of follow-up: z = 2.01	**High-stable** Initial value: z = 0.63 At the end of follow-up: z = 1.01	**Moderate-stable** Initial value: z = 0.12 At the end of the follow-up: z = 0.13	**Low-rising** Initial value: z = -0.70 At the end of follow-up: z = 0.91	**Low-stable** Initial value: z = -1.04 At the end of follow-up: z = -0.57
Length-for-age z score (LAZ)	**High-rising** Initial value: z = 0.43 At the end of follow-up: z = 2.73	**Moderate-rising** Initial value: z = 0.16 At the end of follow-up: z = 1.38	**Moderate-stable** Initial value: z = -0.09 At the end of follow-up: z = 0.49	**Moderate-falling** Initial value: z = -0.23 At the end of follow-up: z = -0.35	**Low-rising** Initial value: z = -1.64 At the end of follow-up: z = -0.75
Weight-for-length z score (WLZ)	**High-rising** Initial value: z = 0.68 At the end of follow-up: z = 1.48	**High-stable** Initial value: z = 0.60 At the end of follow-up: z = 0.63	**Moderate-stable** Initial value: z = -0.14 At the end of follow-up: z = -0.01	**Low-rising** Initial value: z = -0.67 At the end of follow-up: z = 1.10	**Low-stable** Initial value: z = -1.18 At the end of follow-up: z = -0.58
Head-circumference-for-age z score (HCZ)	**High-stable** Initial value: z = 1.10 At the end of follow-up: z = 1.69	**Moderate-rising** Initial value: z = 0.09 At the end of follow-up: z = 1.07	**Moderate-stable** Initial value: z = -0.27 At the end of follow-up: z = -0.30	**Low-stable** Initial value: z = -0.74 At the end of follow-up: z = -0.56	**Low-rising** Initial value: z = -2.20 At the end of follow-up: z = 0.38

Table S4. Bayesian information criterion (BIC) and 2ΔBIC for model selection in group-based trajectory modeling (GBTM) in Shanghai Birth Cohort, Shanghai, China, recruited from 2013 to 2016.

Number of groups	BIC	Null model	2ΔBIC[a]	Posterior probability for final model
Weight-for-age z-score (WAZ)				0.84
1	-9286.13			
2	-8691.49	1	1189.28	
3	-8548.15	2	286.68	
4	-8496.27	3	103.76	
5	-8490.63	4	11.28	
6	-8497.84	5	-14.42	
Length-for-age z-score (LAZ)				0.86
1	-8824.66			
2	-8372.31	1	904.7	
3	-8288.95	2	166.72	
4	-8264.22	3	49.46	
5	-8259.65	4	9.14	
6	-8266.77	5	-14.24	
Weight-for-length z-score (WLZ)				0.72
1	-8215.30			
2	-7867.76	1	695.08	
3	-7823.54	2	88.44	
4	-7777.81	3	91.46	
5	-7755.14	4	45.34	
6	-7755.74	5	-1.2	
Head-circumference-for-age z-score (HCZ)				0.85
1	-7550.48			
2	-7124.89	1	851.18	
3	-7021.93	2	205.92	
4	-7007.96	3	27.94	
5	-7001.03	4	13.86	
6	-7008.02	5	-13.98	

[a] The twice difference in BICs between the current model and the null model.
A value lower than 2 means no enough evidence against the null model.

Table S5 First-trimester maternal plasma concentrations of PFASs (ng/ml) in Shanghai Birth Cohort, Shanghai, China (n = 1,350), recruited from 2013 to 2016.

PFASs	LOD (ng/ml)	% >LOD	Concentrations (ng/ml)						
			Min	Max	5th	25th	50th	75th	95th
PFOS	0.090	100.00	1.85	52.54	4.14	6.75	9.68	13.60	23.36
PFOA	0.090	100.00	2.43	89.10	6.36	9.24	11.66	14.80	20.87
PFNA	0.020	100.00	0.07	10.22	0.77	1.27	1.77	2.41	3.90
PFDA	0.020	100.00	0.21	20.66	0.68	1.23	1.82	2.67	4.74
PFUA	0.020	99.99	0.14	8.11	0.56	1.02	1.48	2.10	3.69
PFHxS	0.020	99.99	0.21	3.75	0.31	0.43	0.54	0.68	0.99
PFHpA	0.030	81.04	0.00	2.49	0.00	0.04	0.06	0.08	0.18
PFDoA	0.050	62.59	0.00	9.89	0.00	0.00	0.15	0.24	7.28
PFBS	0.009	62.37	0.00	7.00	0.00	0.00	0.02	0.05	0.11
PFOSA	0.120	23.48	0.00	0.61	0.00	0.00	0.00	0.00	0.23

Table S6. Odds ratio (OR) and 95% confidence interval (CI) for trajectory groups in each anthropometrical measure according to per doubling increase in prenatal PFAS level (ng/ml) in Shanghai Birth Cohort, Shanghai, China, recruited from 2013 to 2016.

PFAS	OR (95% CI)			
	Weight-for-age z-score (WAZ)	**Length-for-age z-score (LAZ)**	**Weight-for-length z-score (WLZ)**	**Head-circumference-for-age z-score (HCZ)**
	High-rising vs. moderate-stable (n=127 vs. n=429)	**High-rising vs. moderate-stable** (n=36 vs. n=552)	**High-rising vs. moderate-stable** (n=149 vs. n=493)	**High-stable vs. moderate-stable** (n=47 vs. n=472)
PFOS	0.90 (0.68, 1.19)	1.21 (0.77, 1.92)	0.82 (0.63, 1.06)	0.87 (0.57, 1.34)
PFOA	0.93 (0.64, 1.35)	1.35 (0.75, 2.43)	0.98 (0.70, 1.38)	0.92 (0.53, 1.59)
PFNA	0.94 (0.70, 1.26)	1.58 (0.96, 2.58)	0.82 (0.63, 1.07)	0.75 (0.48, 1.17)
PFDA	0.97 (0.75, 1.24)	1.35 (0.89, 2.05)	0.89 (0.71, 1.12)	0.75 (0.51, 1.08)
PFHxS	0.89 (0.60, 1.31)	1.08 (0.57, 2.04)	0.88 (0.62, 1.25)	0.58 (0.32, 1.05)
PFUA	1.00 (0.78, 1.29)	1.41 (0.91, 2.17)	0.86 (0.68, 1.08)	0.71 (0.49, 1.04)
PFHpA	0.91 (0.78, 1.08)	1.23 (0.93, 1.62)	0.85 (0.73, 0.98)	0.75 (0.59, 0.96)
WQS index	0.86 (0.66, 1.12)	1.38 (0.93, 2.05)	0.84 (0.68, 1.05)	0.62 (0.43, 0.89)
	High-stable vs. moderate-stable (n=488 vs. n=429)	**Moderate-rising vs. moderate-stable** (n=312 vs. n=552)	**High-stable vs. moderate-stable** (n=367 vs. n=493)	**Moderate-rising vs. moderate-stable** (n=373 vs. n=472)
PFOS	1.01 (0.85, 1.20)	1.02 (0.84, 1.23)	1.11 (0.92, 1.34)	1.00 (0.82, 1.21)
PFOA	1.06 (0.84, 1.35)	0.90 (0.70, 1.16)	1.09 (0.85, 1.40)	0.97 (0.75, 1.25)
PFNA	1.09 (0.91, 1.32)	0.99 (0.81, 1.21)	1.13 (0.93, 1.38)	1.05 (0.86, 1.28)
PFDA	1.05 (0.90, 1.23)	1.04 (0.88, 1.23)	1.13 (0.95, 1.33)	1.07 (0.90, 1.27)
PFHxS	1.01 (0.79, 1.29)	1.04 (0.80, 1.35)	1.15 (0.89, 1.48)	0.79 (0.61, 1.03)
PFUA	1.09 (0.93, 1.28)	1.05 (0.89, 1.25)	1.11 (0.94, 1.32)	1.09 (0.92, 1.30)
PFHpA	1.02 (0.93, 1.13)	0.97 (0.87, 1.08)	1.01 (0.91, 1.12)	1.07 (0.96, 1.19)
WQS index	1.08 (0.93, 1.27)	0.95 (0.79, 1.14)	1.12 (0.94, 1.34)	1.01 (0.85, 1.20)
	Low-rising vs. moderate-stable (n=157 vs. n=429)	**Moderate-falling vs. moderate-stable** (n=221 vs. n=552)	**Low-rising vs. moderate-stable** (n=74 vs. n=493)	**Low-stable vs. moderate-stable** (n=159 vs. n=472)
PFOS	1.04 (0.81, 1.34)	0.94 (0.76, 1.16)	0.70 (0.51, 0.97)	0.80 (0.62, 1.02)
PFOA	1.23 (0.88, 1.72)	0.92 (0.69, 1.22)	1.01 (0.66, 1.53)	0.75 (0.54, 1.05)
PFNA	1.13 (0.87, 1.47)	0.93 (0.74, 1.15)	0.81 (0.59, 1.12)	0.74 (0.57, 0.95)
PFDA	1.12 (0.90, 1.40)	0.93 (0.77, 1.12)	0.84 (0.64, 1.11)	0.76 (0.61, 0.95)
PFHxS	1.57 (1.13, 2.18)	1.06 (0.79, 1.42)	0.83 (0.55, 1.27)	0.72 (0.51, 1.02)
PFUA	1.13 (0.90, 1.41)	0.95 (0.79, 1.15)	0.84 (0.64, 1.11)	0.75 (0.60, 0.93)
PFHpA	1.01 (0.81, 1.27)	0.98 (0.87, 1.11)	0.83 (0.70, 0.98)	1.05 (0.91, 1.21)
WQS index	1.34 (1.09, 1.65)	0.90 (0.73, 1.10)	0.63 (0.46, 0.74)	0.68 (0.55, 0.85)
	Low-stable vs. moderate-stable (n=145 vs. n=429)	**Low-rising vs. moderate-stable** (n=19 vs. n=552)	**Low-stable vs. moderate-stable** (n=51 vs. n=493)	**Low-rising vs. moderate-stable** (n=42 vs. n=472)
PFOS	1.07 (0.83, 1.37)	0.82 (0.43, 1.55)	1.09 (0.74, 1.60)	0.67 (0.40, 1.14)
PFOA	1.10 (0.77, 1.56)	1.23 (0.52, 2.91)	1.26 (0.75, 2.10)	0.97 (0.49, 1.90)
PFNA	1.18 (0.90, 1.54)	1.17 (0.61, 2.23)	1.08 (0.72, 1.62)	0.64 (0.39, 1.07)
PFDA	1.01 (0.81, 1.27)	0.82 (0.47, 1.43)	1.09 (0.78, 1.54)	0.63 (0.40, 0.99)
PFHxS	1.05 (0.73, 1.50)	0.73 (0.30, 1.78)	1.21 (0.72, 2.02)	0.59 (0.29, 1.20)
PFUA	1.07 (0.85, 1.35)	0.82 (0.48, 1.40)	1.10 (0.77, 1.56)	0.62 (0.40, 0.96)
PFHpA	1.02 (0.88, 1.19)	1.11 (0.76, 1.62)	1.02 (0.81, 1.27)	0.99 (0.75, 1.30)
WQS index	1.10 (0.87, 1.38)	0.73 (0.43, 1.26)	1.20 (0.83, 1.75)	0.50 (0.31, 0.80)

A WQS index was created using all six types of PFAS to reflect the mixture exposure level.
All models were adjusted for maternal age, maternal education, pre-pregnancy BMI, fish and seafood intake, parity, and pregnancy estimated glomerular filtration rate (eGFR).

Table S7. Weights for each PFAS in weighted quantile sum (WQS) regression in Shanghai Birth Cohort, Shanghai, China, recruited from 2013 to 2016.

PFAS	Weights for each PFAS in WQS regression			
	Weight-for-age z-score (WAZ)	**Length-for-age z-score (LAZ)**	**Weight-for-length z-score (WLZ)**	**Head-circumference-for-age z-score (HCZ)**
	High-rising vs. moderate-stable (n=127 vs. n=429)	**High-rising vs. moderate-stable** (n=36 vs. n=552)	**High-rising vs. moderate-stable** (n=149 vs. n=493)	**High-stable vs. moderate-stable** (n=47 vs. n=472)
PFOS	0.22	0.04	0.27	<0.01
PFOA	0.26	0.10	<0.01	0.01
PFNA	0.04	0.06	0.14	0.12
PFDA	0.05	0.53	0.10	0.18
PFHxS	0.37	<0.01	0.33	0.34
PFUA	<0.01	0.14	0.04	0.33
PFHpA	0.06	0.13	0.12	<0.01
	High-stable vs. moderate-stable (n=488 vs. n=429)	**Moderate-rising vs. moderate-stable** (n=312 vs. n=552)	**High-stable vs. moderate-stable** (n=367 vs. n=493)	**Moderate-rising vs. moderate-stable** (n=373 vs. n=472)
PFOS	<0.01	0.06	0.01	0.07
PFOA	0.04	0.18	0.26	0.08
PFNA	0.09	0.10	0.07	0.02
PFDA	0.13	0.05	0.38	0.10
PFHxS	0.08	0.08	0.05	<0.01
PFUA	0.47	0.09	0.04	0.47
PFHpA	0.18	0.44	0.19	0.26
	Low-rising vs. moderate-stable (n=157 vs. n=429)	**Moderate-falling vs. moderate-stable** (n=221 vs. n=552)	**Low-rising vs. moderate-stable** (n=74 vs. n=493)	**Low-stable vs. moderate-stable** (n=159 vs. n=472)
PFOS	<0.01	0.17	0.19	0.01
PFOA	0.02	0.20	<0.01	0.02
PFNA	0.02	0.05	0.03	0.07
PFDA	0.02	0.03	0.02	0.11
PFHxS	0.74	0.03	0.00	0.27
PFUA	0.13	0.21	0.17	0.51
PFHpA	0.07	0.32	0.58	0.02
	Low-stable vs. moderate-stable (n=145 vs. n=429)	**Low-rising vs. moderate-stable** (n=19 vs. n=552)	**Low-stable vs. moderate-stable** (n=51 vs. n=493)	**Low-rising vs. moderate-stable** (n=42 vs. n=472)
PFOS	0.09	0.08	0.09	0.02
PFOA	0.04	<0.01	0.41	0.11
PFNA	0.48	<0.01	0.01	0.19
PFDA	<0.01	0.01	0.03	0.33
PFHxS	0.11	0.45	0.11	0.20
PFUA	0.16	0.40	0.13	0.10
PFHpA	0.12	0.07	0.22	0.05

All models were adjusted for maternal age, maternal education, pre-pregnancy BMI, fish and seafood intake, parity, and pregnancy estimated glomerular filtration rate (eGFR).

Table S8. Odds ratio (OR) and 95% confidence interval (CI) for trajectory groups of weight-for-age and length-for-age according to per doubling increase in prenatal PFAS level (ng/ml) (stratified by sex) in Shanghai Birth Cohort, Shanghai, China, recruited from 2013 to 2016.

PFAS	OR (95% CI)					
	Weight-for-age z-score (WAZ)			Length-for-age z-score (LAZ)		
	Female	Male	*P* for interaction	Female	Male	*P* for interaction
	High-rising vs. moderate-stable			**High-rising vs. moderate-stable**		
	n=75 vs. n=224	n=52 vs. n=205		n=20 vs. n=299	n=16 vs. n=253	
PFOS	0.81 (0.52, 1.26)	0.99 (0.67, 1.45)	0.58	1.68 (0.79, 3.58)	1.11 (0.59, 2.08)	0.66
PFOA	1.15 (0.66, 2.01)	0.78 (0.46, 1.33)	0.32	2.37 (1.02, 5.50)	0.84 (0.35, 2.04)	0.13
PFNA	1.01 (0.63, 1.60)	0.88 (0.58, 1.34)	0.56	2.33 (1.05, 5.17)	1.39 (0.69, 2.79)	0.31
PFDA	0.93 (0.63, 1.36)	1.03 (0.73, 1.46)	0.84	1.52 (0.79, 2.93)	1.46 (0.81, 2.62)	0.94
PFHxS	1.06 (0.59, 1.89)	0.82 (0.48, 1.40)	0.48	1.39 (0.54, 3.61)	0.62 (0.26, 1.49)	0.28
PFUA	0.95 (0.64, 1.42)	1.07 (0.75, 1.51)	0.76	1.52 (0.77, 3.02)	1.52 (0.82, 2.79)	0.84
PFHpA	0.84 (0.66, 1.08)	0.98 (0.79, 1.22)	0.27	1.20 (0.80, 1.81)	1.20 (0.82, 1.76)	0.61
WQS index	0.86 (0.59, 1.25)	0.99 (0.78, 1.27)	0.38	1.47 (0.88, 2.47)	1.50 (0.83, 2.72)	0.42
	High-stable vs. moderate-stable			**Moderate-rising vs. moderate-stable**		
	n=232 vs. n=224	n=256 vs. n=205		n=148 vs. n=299	n=164 vs. n=253	
PFOS	0.88 (0.68, 1.14)	1.17 (0.90, 1.50)	0.09	1.03 (0.78, 1.35)	1.04 (0.79, 1.37)	0.98
PFOA	0.89 (0.64, 1.24)	1.02 (0.71, 1.46)	0.71	1.01 (0.72, 1.44)	0.82 (0.56, 1.21)	0.46
PFNA	1.05 (0.80, 1.38)	1.15 (0.87, 1.51)	0.86	1.10 (0.82, 1.46)	0.94 (0.70, 1.25)	0.29
PFDA	0.96 (0.77, 1.20)	1.21 (0.95, 1.53)	0.20	1.03 (0.81, 1.31)	1.10 (0.86, 1.42)	0.94
PFHxS	0.90 (0.64, 1.27)	1.18 (0.82, 1.71)	0.29	1.21 (0.84, 1.75)	0.92 (0.63, 1.34)	0.44
PFUA	1.01 (0.80, 1.27)	1.23 (0.97, 1.56)	0.24	0.98 (0.77, 1.26)	1.17 (0.91, 1.51)	0.52
PFHpA	1.06 (0.91, 1.22)	0.99 (0.86, 1.15)	0.43	1.01 (0.87, 1.18)	0.92 (0.79, 1.07)	0.32
WQS index	0.99 (0.78, 1.27)	1.22 (0.98, 1.51)	0.53	1.00 (0.80, 1.25)	1.18 (0.91, 1.52)	0.15
	Low-rising vs. moderate-stable			**Moderate-falling vs. moderate-stable**		
	n=89 vs. n=224	n=68 vs. n=205		n=128 vs. n=299	n=93 vs. n=253	
PFOS	0.87 (0.59, 1.28)	1.27 (0.90, 1.78)	0.17	0.95 (0.68, 1.34)	0.93 (0.70, 1.25)	0.95
PFOA	0.95 (0.59, 1.56)	1.64 (1.02, 2.66)	0.12	0.98 (0.63, 1.51)	0.85 (0.57, 1.27)	0.46
PFNA	0.96 (0.64, 1.44)	1.35 (0.94, 1.94)	0.32	0.90 (0.63, 1.28)	0.96 (0.71, 1.29)	0.76
PFDA	1.07 (0.77, 1.50)	1.24 (0.90, 1.70)	0.66	0.91 (0.68, 1.22)	0.96 (0.74, 1.25)	0.64
PFHxS	1.17 (0.72, 1.91)	2.12 (1.33, 3.39)	0.10	1.53 (0.98, 2.37)	0.78 (0.52, 1.17)	0.02
PFUA	1.03 (0.73, 1.45)	1.29 (0.94, 1.78)	0.37	0.90 (0.67, 1.22)	1.01 (0.78, 1.32)	0.40
PFHpA	0.95 (0.77, 1.17)	1.03 (0.84, 1.25)	0.62	0.90 (0.75, 1.09)	1.05 (0.89, 1.24)	0.29
WQS index	1.13 (0.82, 1.55)	1.62 (1.22, 2.13)	0.12	0.98 (0.76, 1.25)	0.86 (0.63, 1.16)	0.30
	Low-stable vs. moderate-stable			**Low-rising vs. moderate-stable**		
	n=83 vs. n=224	n=62 vs. n=205		n=13 vs. n=299	n=6 vs. n=253	
PFOS	0.84 (0.55, 1.26)	1.34 (0.95, 1.90)	0.12	NA	NA	NA
PFOA	0.67 (0.40, 1.13)	1.12 (0.68, 1.84)	0.25	NA	NA	NA
PFNA	0.82 (0.53, 1.26)	1.62 (1.10, 2.39)	0.04	NA	NA	NA
PFDA	0.80 (0.56, 1.15)	1.25 (0.90, 1.73)	0.11	NA	NA	NA
PFHxS	0.96 (0.56, 1.65)	1.12 (0.68, 1.86)	0.82	NA	NA	NA
PFUA	0.86 (0.60, 1.25)	1.34 (0.96, 1.87)	0.14	NA	NA	NA
PFHpA	0.90 (0.72, 1.13)	1.04 (0.84, 1.28)	0.33	NA	NA	NA
WQS index	0.86 (0.63, 1.19)	1.34 (0.95, 1.88)	0.34	NA	NA	NA

CI, confidence interval; OR, odds ratio; WQS, weighted quantile sum.
All models were adjusted for maternal age, maternal education, pre-pregnancy BMI, fish and seafood intake, parity, and pregnancy estimated glomerular filtration rate (eGFR).

Table S9. Odds ratio (OR) and 95% confidence interval (CI) for trajectory groups of weight-for-length and head-circumference-for-age according to per doubling increase in prenatal PFAS level (ng/ml) (stratified by sex) in Shanghai Birth Cohort, Shanghai, China, recruited from 2013 to 2016.

PFAS	OR (95% CI)					
	Weight-for-length (WLZ)			Head-circumference-for-age (HCZ)		
	Female	Male	*P* for interaction	Female	Male	*P* for interaction
	High-rising vs. moderate-stable			**High-stable vs. moderate-stable**		
	n=96 vs. n=252	n=53 vs. n=241		n=22 vs. n=270	n=25 vs. n=202	
PFOS	0.87 (0.57, 1.34)	0.80 (0.57, 1.12)	0.56	0.80 (0.44, 1.46)	0.93 (0.50, 1.73)	0.96
PFOA	0.99 (0.57, 1.71)	1.01 (0.65, 1.59)	0.82	1.23 (0.58, 2.61)	0.60 (0.26, 1.36)	0.18
PFNA	0.78 (0.50, 1.22)	0.84 (0.59, 1.18)	0.68	1.01 (0.54, 1.89)	0.61 (0.35, 1.06)	0.19
PFDA	0.88 (0.61, 1.28)	0.92 (0.68, 1.24)	0.77	0.79 (0.47, 1.32)	0.68 (0.39, 1.17)	0.60
PFHxS	0.89 (0.50, 1.59)	0.89 (0.56, 1.41)	0.79	0.63 (0.28, 1.42)	0.52 (0.22, 1.25)	0.70
PFUA	0.86 (0.59, 1.27)	0.86 (0.64, 1.16)	0.82	0.69 (0.40, 1.18)	0.72 (0.43, 1.21)	1.00
PFHpA	0.72 (0.86, 0.93)	0.94 (0.70, 1.12)	0.05	0.64 (0.45, 0.91)	0.88 (0.62, 1.25)	0.27
WQS index	0.84 (0.68, 1.05)	0.87 (0.60, 1.25)	0.72	0.60 (0.34, 1.06)	0.75 (0.36, 1.57)	0.15
	High-stable vs. moderate-stable			**Moderate-rising vs. moderate-stable**		
	n=187 vs. n=252	n=180 vs. n=241		n=184 vs. n=270	n=189 vs. n=202	
PFOS	0.89 (0.67, 1.17)	1.32 (1.02, 1.72)	0.05	0.90 (0.68, 1.2,)	1.09 (0.83, 1.42)	0.68
PFOA	1.09 (0.77, 1.55)	1.15 (0.80, 1.67)	0.98	1.05 (0.73, 1.51)	0.86 (0.60, 1.24)	0.48
PFNA	1.02 (0.76, 1.36)	1.25 (0.94, 1.65)	0.38	0.98 (0.73, 1.32)	1.11 (0.84, 1.48)	0.78
PFDA	0.93 (0.73, 1.19)	1.36 (1.06, 1.74)	0.04	0.93 (0.73, 1.19)	1.24 (0.97, 1.58)	0.30
PFHxS	1.08 (0.74, 1.56)	1.27 (0.88, 1.84)	0.48	0.96 (0.66, 1.39)	0.65 (0.44, 0.95)	0.16
PFUA	0.95 (0.74, 1.23)	1.28 (1.00, 1.63)	0.10	0.92 (0.72, 1.19)	1.30 (1.01, 1.67)	0.18
PFHpA	1.11 (0.94, 1.31)	0.93 (0.80, 1.08)	0.13	1.15 (0.98, 1.35)	1.01 (0.87, 1.17)	0.33
WQS index	1.06 (0.82, 1.36)	1.14 (0.89, 1.46)	0.90	1.01 (0.85, 1.2,)	1.12 (0.87, 1.45)	0.37
	Low-rising vs. moderate-stable			**Low-stable vs. moderate-stable**		
	n=31 vs. n=252	n=43 vs. n=241		n=91 vs. n=270	n=68 vs. n=202	
PFOS	0.49 (0.30, 0.79)	0.96 (0.62, 1.51)	0.08	0.66 (0.44, 0.99)	0.95 (0.68, 1.32)	0.38
PFOA	0.98 (0.55, 1.73)	1.05 (0.56, 1.98)	0.99	0.62 (0.37, 1.03)	0.82 (0.52, 1.29)	0.52
PFNA	0.53 (0.33, 0.85)	1.24 (0.77, 2.01)	0.03	0.62 (0.41, 0.93)	0.90 (0.64, 1.27)	0.14
PFDA	0.60 (0.40, 0.89)	1.20 (0.79, 1.82)	0.04	0.62 (0.44, 0.88)	0.94 (0.69, 1.26)	0.11
PFHxS	0.80 (0.43, 1.48)	1.85 (1.00, 3.41)	0.11	0.80 (0.48, 1.33)	0.67 (0.42, 1.07)	0.54
PFUA	0.55 (0.37, 0.83)	1.28 (0.84, 1.97)	0.01	0.60 (0.42, 0.85)	0.92 (0.68, 1.24)	0.12
PFHpA	0.78 (0.61, 0.99)	0.87 (0.68, 1.12)	0.55	1.00 (0.81, 1.25)	1.10 (0.90, 1.33)	0.32
WQS index	0.73 (0.48, 1.12)	1.14 (0.78, 1.64)	0.12	0.68 (0.55, 0.85)	0.57 (0.41, 0.80)	0.27
	Low-stable vs. moderate-stable			**Low-rising vs. moderate-stable**		
	n=22 vs. n=252	n=29 vs. n=241		n=14 vs. n=270	n=17 vs. n=202	
PFOS	1.15 (0.64, 2.06)	1.11 (0.64, 1.93)	0.89	0.48 (0.22, 1.01)	1.01 (0.46, 2.20)	0.14
PFOA	1.12 (0.58, 2.16)	1.55 (0.70, 3.40)	0.52	0.81 (0.32, 2.03)	1.19 (0.40, 3.54)	0.73
PFNA	0.97 (0.55, 1.74)	1.33 (0.73, 2.42)	0.39	0.53 (0.26, 1.09)	0.88 (0.38, 2.04)	0.36
PFDA	1.08 (0.67, 1.74)	1.18 (0.70, 1.99)	0.65	0.48 (0.26, 0.9,)	0.92 (0.45, 1.88)	0.22
PFHxS	0.86 (0.42, 1.78)	1.64 (0.78, 3.47)	0.30	0.44 (0.16, 1.19)	0.88 (0.30, 2.57)	0.36
PFUA	1.10 (0.66, 1.82)	1.19 (0.70, 2.05)	0.69	0.45 (0.24, 0.84)	0.92 (0.45, 1.86)	0.17
PFHpA	0.91 (0.67, 1.23)	1.09 (0.76, 1.57)	0.34	0.80 (0.56, 1.15)	1.29 (0.81, 2.03)	0.08
WQS index	1.20 (0.83, 1.75)	1.10 (0.68 1.79)	0.72	0.50 (0.31, 0.80)	0.76 (0.35 1.68)	0.26

CI, confidence interval; OR, odds ratio; WQS, weighted quantile sum.

All models were adjusted for maternal age, maternal education, pre-pregnancy BMI, fish and seafood intake, parity, and pregnancy estimated glomerular filtration rate (eGFR).

Table S10. The number of participants in each trajectory and the number by sex in Shanghai Birth Cohort, Shanghai, China, recruited from 2013 to 2016.

Trajectory groups	Total number of participants	Male	Female
Weight-for-age z-score (WAZ)			
High-rising	127	52	75
High-stable	488	256	232
Moderate-stable	429	205	224
Low-rising	157	68	89
Low-stable	145	62	83
Length-for-age z-score (LAZ)			
High-rising	36	16	20
Moderate-rising	312	164	148
Moderate-stable	552	253	299
Moderate-falling	221	93	128
Low-rising	19	6	13
Weight-for-length z-score (WLZ)			
High-rising	149	53	96
High-stable	367	180	187
Moderate-stable	493	241	252
Low-rising	74	43	31
Low-stable	51	29	22
Head-circumference-for-age z-score (HCZ)			
High-stable	47	25	22
Moderate-stable	373	189	184
Moderate-rising	472	202	270
Low-rising	159	68	91
Low-stable	31	17	14

Table S11. Odds ratio (OR) and 95% confidence interval (CI) for trajectory groups in each anthropometrical measure according to per doubling increase in prenatal PFAS level (ng/ml) for sensitivity analysis in Shanghai Birth Cohort, Shanghai, China, recruited from 2013 to 2016 (additionally adjusted for active or passive smoking during pregnancy, gestational weight gain, breastfeeding after birth, delivery method, child sex, nutrient supplementation during pregnancy, infant nutrient supplementation, and infancy outdoor activity).

PFAS	OR (95% CI)			
	Weight-for-age z-score (WAZ)	**Length-for-age z-score (LAZ)**	**Weight-for-length z-score (WLZ)**	**Head-circumference-for-age z-score (HCZ)**
	High-rising vs. moderate-stable (n=127 vs. n=429)	**High-rising vs. moderate-stable** (n=36 vs. n=552)	**High-rising vs. moderate-stable** (n=149 vs. n=493)	**High-stable vs. moderate-stable** (n=47 vs. n=472)
PFOS	0.98 (0.70, 1.36)	1.53 (0.92, 2.54)	0.85 (0.64, 1.15)	0.98 (0.59, 1.63)
PFOA	1.07 (0.70, 1.62)	1.44 (0.78, 2.66)	1.02 (0.69, 1.51)	0.75 (0.40, 1.43)
PFNA	1.00 (0.72, 1.40)	1.92 (1.11, 3.31)	0.88 (0.65, 1.19)	0.78 (0.47, 1.31)
PFDA	1.00 (0.75, 1.34)	1.51 (0.96, 2.37)	0.91 (0.70, 1.18)	0.79 (0.51, 1.24)
PFHxS	1.01 (0.65, 1.55)	1.07 (0.56, 2.06)	0.96 (0.65, 1.42)	0.70 (0.36, 1.36)
PFUA	1.00 (0.74, 1.33)	1.49 (0.92, 2.41)	0.87 (0.67, 1.13)	0.75 (0.48, 1.16)
PFHpA	1.12 (0.94, 1.34)	1.19 (0.88, 1.60)	0.85 (0.72, 1.01)	0.75 (0.56, 1.00)
WQS index	1.02 (0.71, 1.46)	1.56 (1.03, 2.36)	0.83 (0.68, 1.05)	0.72 (0.52, 0.99)
	High-stable vs. moderate-stable (n=488 vs. n=429)	**Moderate-rising vs. moderate-stable** (n=312 vs. n=552)	**High-stable vs. moderate-stable** (n=367 vs. n=493)	**Moderate-rising vs. moderate-stable** (n=373 vs. n=472)
PFOS	1.06 (0.86, 1.32)	0.96 (0.78, 1.18)	1.03 (0.83, 1.27)	0.98 (0.79, 1.21)
PFOA	1.03 (0.78, 1.37)	0.89 (0.68, 1.17)	1.18 (0.90, 1.56)	0.97 (0.73, 1.28)
PFNA	1.16 (0.93, 1.45)	0.94 (0.75, 1.16)	1.05 (0.85, 1.31)	0.99 (0.80, 1.23)
PFDA	1.08 (0.89, 1.30)	0.99 (0.82, 1.20)	1.03 (0.86, 1.25)	1.01 (0.83, 1.21)
PFHxS	1.04 (0.78, 1.39)	1.12 (0.85, 1.47)	1.29 (0.97, 1.71)	0.72 (0.54, 0.96)
PFUA	1.12 (0.92, 1.35)	0.96 (0.79, 1.16)	1.03 (0.85, 1.25)	1.01 (0.83, 1.22)
PFHpA	1.07 (0.95, 1.21)	0.97 (0.87, 1.09)	1.01 (0.90, 1.13)	1.13 (0.99, 1.28)
WQS index	1.10 (0.95, 1.27)	0.92 (0.76, 1.11)	1.20 (0.98, 1.47)	1.09 (0.97, 1.22)
	Low-rising vs. moderate-stable (n=157 vs. n=429)	**Moderate-falling vs. moderate-stable** (n=221 vs. n=552)	**Low-rising vs. moderate-stable** (n=74 vs. n=493)	**Low-stable vs. moderate-stable** (n=159 vs. n=472)
PFOS	1.16 (0.87, 1.56)	0.97 (0.78, 1.22)	0.86 (0.58, 1.26)	0.82 (0.61, 1.09)
PFOA	1.26 (0.85, 1.86)	0.94 (0.70, 1.26)	0.97 (0.59, 1.62)	0.72 (0.49, 1.05)
PFNA	1.27 (0.93, 1.72)	0.96 (0.76, 1.21)	0.94 (0.63, 1.39)	0.79 (0.59, 1.06)
PFDA	1.23 (0.95, 1.60)	0.91 (0.74, 1.12)	0.99 (0.70, 1.39)	0.81 (0.63, 1.05)
PFHxS	1.48 (1.02, 2.16)	1.19 (0.88, 1.60)	0.87 (0.52, 1.45)	0.61 (0.41, 0.90)
PFUA	1.21 (0.93, 1.58)	0.91 (0.74, 1.11)	0.98 (0.70, 1.38)	0.81 (0.62, 1.05)
PFHpA	1.04 (0.88, 1.23)	0.95 (0.83, 1.08)	0.91 (0.74, 1.12)	0.93 (0.79, 1.09)
WQS index	1.31 (1.01, 1.70)	0.92 (0.76, 1.13)	0.76 (0.56, 1.03)	0.72 (0.56, 0.93)
	Low-stable vs. moderate-stable (n=145 vs. n=429)	**Low-rising vs. moderate-stable** (n=19 vs. n=552)	**Low-stable vs. moderate-stable** (n=51 vs. n=493)	**Low-rising vs. moderate-stable** (n=42 vs. n=472)
PFOS	1.21 (0.87, 1.68)	0.60 (0.31, 1.16)	1.16 (0.72, 1.86)	0.71 (0.38, 1.31)
PFOA	1.16 (0.76, 1.78)	0.93 (0.40, 2.16)	1.16 (0.63, 2.12)	0.97 (0.46, 2.07)
PFNA	1.41 (1.00, 1.99)	1.01 (0.53, 1.92)	1.28 (0.78, 2.10)	0.72 (0.41, 1.24)
PFDA	1.10 (0.82, 1.49)	0.64 (0.35, 1.16)	1.26 (0.81, 1.96)	0.64 (0.38, 1.09)
PFHxS	1.17 (0.76, 1.80)	0.61 (0.25, 1.49)	1.08 (0.58, 2.01)	0.45 (0.19, 1.04)
PFUA	1.22 (0.90, 1.66)	0.67 (0.38, 1.17)	1.31 (0.83, 2.08)	0.61 (0.36, 1.03)
PFHpA	1.04 (0.87, 1.25)	0.91 (0.64, 1.30)	1.16 (0.88, 1.52)	0.93 (0.58, 1.28)
WQS index	1.33 (1.00, 1.77)	0.66 (0.21, 2.07)	1.20 (0.82, 1.75)	0.61 (0.37, 1.00)

All models were adjusted for maternal age, maternal education, pre-pregnancy BMI, fish and seafood intake during pregnancy, parity, and pregnancy eGFR, and additionally adjusted for active or passive smoking during pregnancy, pre-pregnancy BMI, gestational weight gain, breastfeeding after birth, delivery method, child sex, nutrient supplementation during pregnancy, infant nutrient supplementation, and infancy outdoor activity.

Table S12. *P* values for departure from linearity in generalized additive models (GAM) in Shanghai Birth Cohort, Shanghai, China, recruited from 2013 to 2016.

PFAS	P value for linearity departure from generalized additive model			
	Weight-for-age z-score (WAZ)	**Length-for-age z-score (LAZ)**	**Weight-for-length z-score (WLZ)**	**Head-circumference-for-age z-score (HCZ)**
	High-rising vs. moderate-stable (n=127 vs. n=429)	**High-rising vs. moderate-stable** (n=36 vs. n=552)	**High-rising vs. moderate-stable** (n=149 vs. n=493)	**High-stable vs. moderate-stable** (n=47 vs. n=472)
PFOS	0.83	0.60	0.47	0.06
PFOA	0.69	0.71	0.15	0.07
PFNA	0.64	0.19	0.36	0.15
PFDA	0.75	0.12	0.27	0.03
PFHxS	0.25	0.20	0.15	0.06
PFUA	0.99	0.18	0.39	0.13
PFHpA	0.06	0.21	0.03	0.11
	High-stable vs. moderate-stable (n=488 vs. n=429)	**Moderate-rising vs. moderate-stable** (n=312 vs. n=552)	**High-stable vs. moderate-stable** (n=367 vs. n=493)	**Moderate-rising vs. moderate-stable** (n=373 vs. n=472)
PFOS	0.74	0.95	0.65	0.88
PFOA	0.72	0.33	0.49	0.93
PFNA	0.44	0.93	0.67	0.82
PFDA	0.49	0.92	0.52	0.32
PFHxS	0.93	0.89	0.50	0.19
PFUA	0.32	0.69	0.65	0.36
PFHpA	0.32	0.38	0.91	0.67
	Low-rising vs. moderate-stable (n=157 vs. n=429)	**Moderate-falling vs. moderate-stable** (n=221 vs. n=552)	**Low-rising vs. moderate-stable** (n=74 vs. n=493)	**Low-stable vs. moderate-stable** (n=159 vs. n=472)
PFOS	0.43	0.52	0.06	0.09
PFOA	0.42	0.16	0.94	0.10
PFNA	0.30	0.62	0.24	0.02
PFDA	0.21	0.35	0.31	0.05
PFHxS	0.11	0.96	0.59	0.13
PFUA	0.21	0.87	0.28	0.04
PFHpA	0.18	0.66	0.01	0.61
	Low-stable vs. moderate-stable (n=145 vs. n=429)	**Low-rising vs. moderate-stable** (n=19 vs. n=552)	**Low-stable vs. moderate-stable** (n=51 vs. n=493)	**Low-rising vs. moderate-stable** (n=42 vs. n=472)
PFOS	0.80	0.70	0.64	0.18
PFOA	0.76	0.83	0.45	0.34
PFNA	0.55	0.98	0.86	0.08
PFDA	0.71	0.58	0.75	0.07
PFHxS	0.92	0.55	0.66	0.17
PFUA	0.45	0.57	0.86	0.05
PFHpA	0.98	0.39	0.69	0.48

All models were adjusted for maternal age, maternal education, pre-pregnancy BMI, fish and seafood intake, parity, and pregnancy estimated glomerular filtration rate (eGFR).

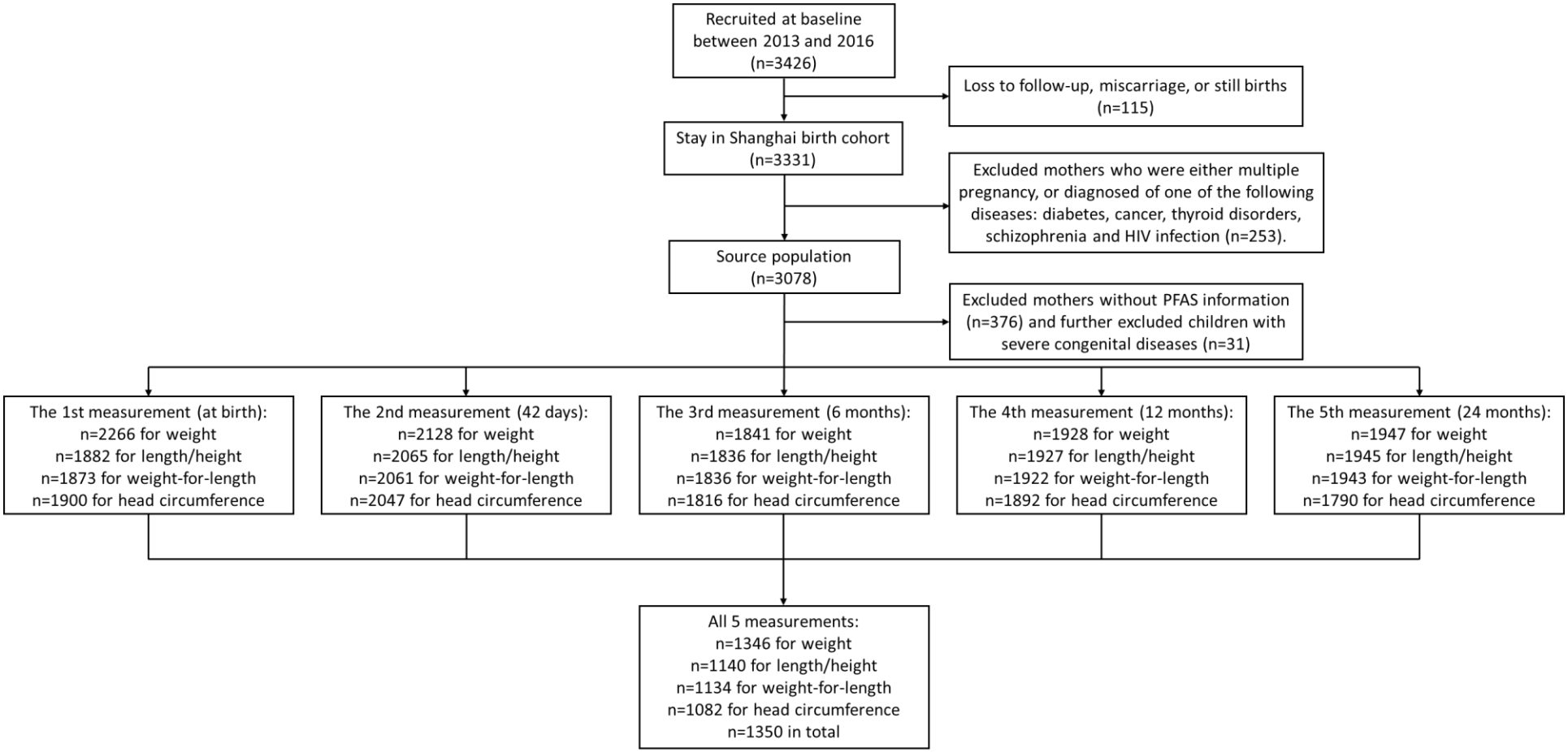

Figure S1. Flowchart for study population selection in Shanghai Birth Cohort, Shanghai, China, recruited from 2013 to 2016.

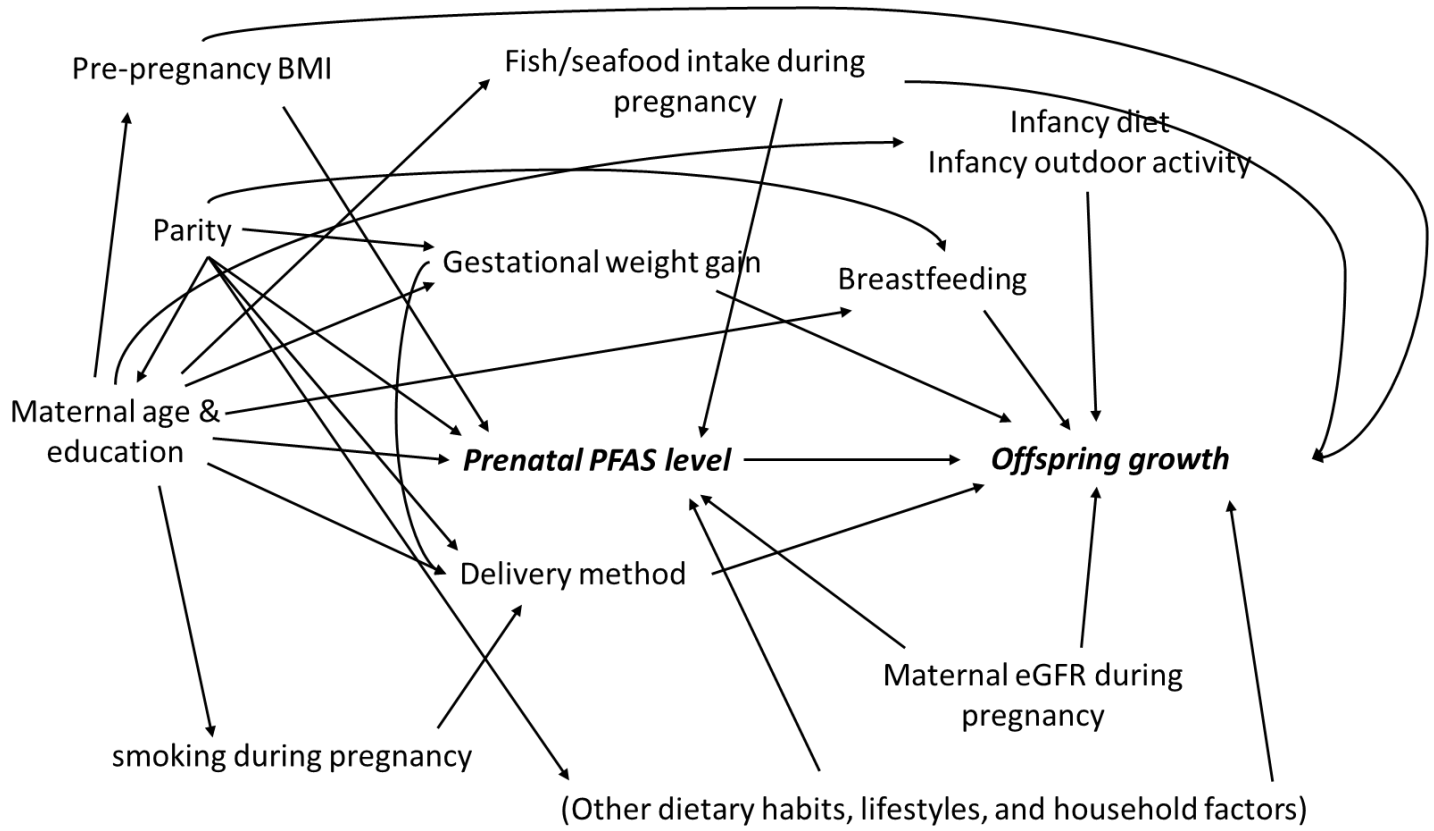

Figure S2. The directed acyclic graph (DAG) for all potential confounders considered in the statistical analyses in Shanghai Birth Cohort, Shanghai, China, recruited from 2013 to 2016. The directed paths from prenatal PFAS to offspring growth represents the potential causal effect of interests that we aim to investigate in this study. Variables with parenthesis indicate possible unmeasured/uncontrolled confounders that should be evaluated for their potential impacts in future studies.

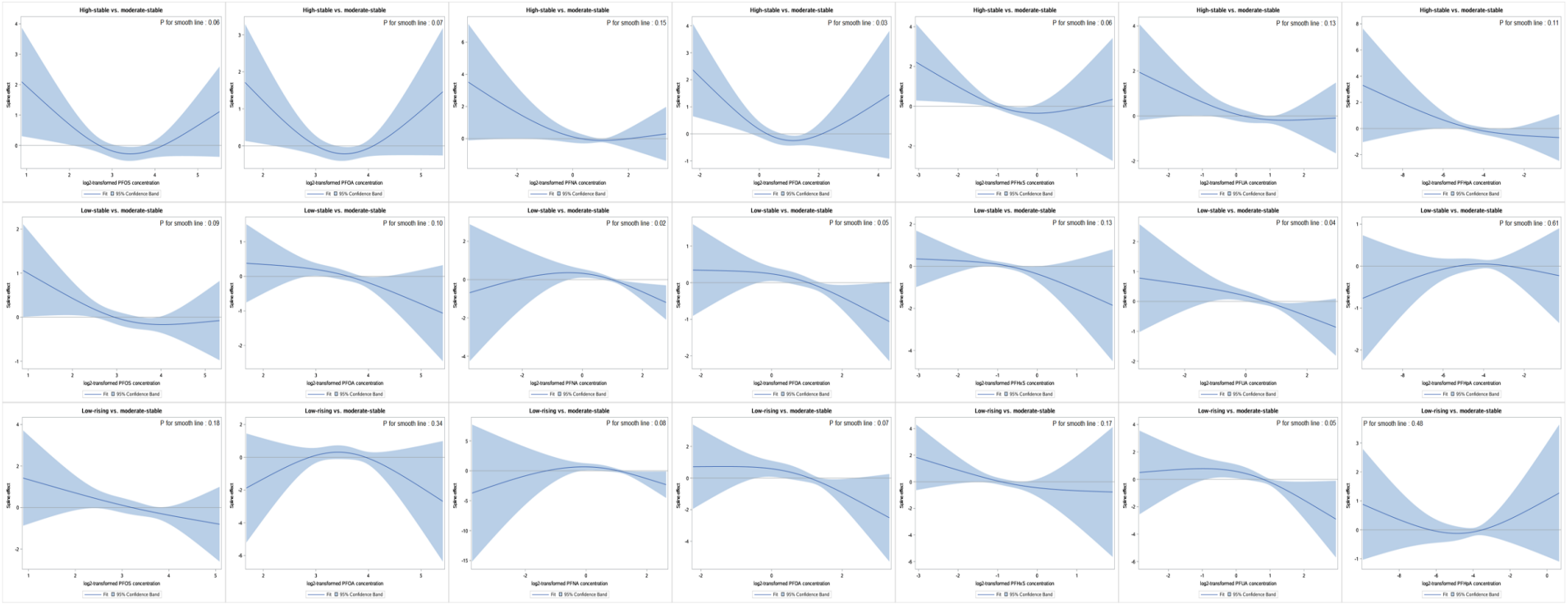

Figure S3. Relationship between prenatal PFAS level (ng/ml) and trajectory groups in each anthropometrical measure in the generalized additive models (GAM), both the fitted and 95% confidence interval lines are presented in Shanghai Birth Cohort, Shanghai, China, recruited from 2013 to 2016.