Supplemental Material for

Plasma Concentrations of Per- and Polyfluoroalkyl Substances and Body Composition from Mid-childhood to Early Adolescence

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Competing Financial Interests

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Data Availability

Restrictions apply to the availability of some or all data generated or analyzed during this study to preserve patient confidentiality or because they were used under license. The corresponding author will on request detail the restrictions and any conditions under which access to some data may be provided.

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Supplemental Table 1. Characteristics of Project Viva participants who attended the mid-childhood and early adolescent visits, overall and among those included in versus excluded from this analysis.

	Overall	**Excluded**	**Included**
	n = 901	*n* = 364	*n* = 537
Characteristic		*Mean (SD) or n (%)*	
Mother/household characteristics			
Mother's age at enrollment (years)	32.3 (5.2)	32.5 (4.8)	32.2 (5.3)
College graduate	632 (70%)	272 (75%)	360 (67%)
Gestational weight gain	15.5 (5.2)	15.3 (5.1)	15.6 (5.3)
Child characteristics			
Age at mid-childhood visit (years)	7.9 (0.8)	7.9 (0.9)	7.9 (0.8)
Age at early teen visit (years)	13.1 (0.9)	13.1 (0.9)	13.1 (0.8)
Female	559 (50%)	308 (53%)	251 (47%)
Race/ethnicity			
Black	146 (16%)	38 (10%)	108 (20%)
White	583 (65%)	260 (71%)	323 (60%)
Asian	26 (2.9%)	14 (3.8%)	12 (2.2%)
Hispanic	40 (4.4%)	10 (2.7%)	30 (5.6%)
Other	105 (12%)	42 (12%)	63 (12%)

Abbreviations: SD, standard deviation

Supplemental Table 2. Median (IQR) and Spearman correlation coefficients of per- and polyfluoroalkyl substance plasma concentrations in mid-childhood.

	PFOA	PFOS	PFDA	PFHxS	MeFOSAA	PFNA
Median (IQR), ng/mL	4.5 (3.0)	6.4 (5.9)	0.3 (0.3)	1.9 (2.4)	0.3 (0.5)	1.5 (1.2)
			Spearman correlation coefficients			
PFOA	1.00					
PFOS	0.77	1.00				
PFDA	0.69	0.57	1.00			
PFHxS	0.58	0.66	0.33	1.00		
MeFOSAA	0.48	0.63	0.30	0.35	1.00	
PFNA	0.44	0.33	0.57	0.12	0.21	1.00

Abbreviations: PFOA, perfluorooctanoate; PFOS, perfluorooctane sulfonate; PFDA, perfluorodecanoate; PFHxS, perfluorohexane sulfonate; MeFOSAA, N-methyl-perfluorooctane sulfonamido acetate; PFNA, perfluorononanoate.

Supplemental Table 3. Covariate-adjusted change in A) BMI Z-score, B) total fat mass index, C) truncal fat mass index, and D) lean mass index from mid-childhood to early adolescence per doubling of plasma per- and polyfluoroalkyl substance (PFAS) concentrations in the full cohort, with additional adjustment for maternal prenatal PFAS plasma concentrations, and in girls and boys.

PFAS (measured in mid-childhood)	Full cohort[a]	Full cohort, additionally adjusted for maternal prenatal PFAS[b]	Girls[c]	Boys[c]
A) Change in BMI Z-score β (95% CI)				
	n = 526	*n* = 427	*n* = 248	*n* = 278
PFOA	-0.02 (-0.10, 0.06)	-0.06 (-0.15, 0.03)	-0.02 (-0.15, 0.10)	0.00 (-0.11, 0.11)
PFOS	-0.06 (-0.12, 0.00)	-0.06 (-0.12, 0.01)	-0.06 (-0.16, 0.03)	-0.06 (-0.14, 0.03)
PFDA	-0.02 (-0.08, 0.04)	-0.04 (-0.1, 0.02)	-0.04 (-0.13, 0.04)	0.02 (-0.07, 0.10)
PFHxS	-0.05 (-0.09, 0.00)	-0.04 (-0.09, 0.01)	-0.05 (-0.11, 0.01)	-0.04 (-0.10, 0.02)
MeFOSAA	-0.02 (-0.05, 0.02)	-0.01 (-0.04, 0.03)	-0.01 (-0.06, 0.04)	-0.02 (-0.07, 0.03)
PFNA	-0.01 (-0.06, 0.05)	0.00 (-0.07, 0.06)	0.00 (-0.09, 0.08)	0.00 (-0.08, 0.08)
B) Change in total fat mass index[d] β (95% CI)				
	n = 417	*n* = 337	*n* = 205	*n* = 212
PFOA	-0.18 (-0.47, 0.11)	**-0.35 (-0.65, -0.04)**	-0.23 (-0.63, 0.16)	-0.02 (-0.43, 0.39)
PFOS	**-0.32 (-0.54, -0.11)**	**-0.34 (-0.57, -0.12)**	**-0.31 (-0.61, -0.02)**	**-0.32 (-0.63, -0.02)**
PFDA	0.09 (-0.10, 0.28)[e]	0.03 (-0.18, 0.23)	-0.10 (-0.36, 0.16)	**0.34 (0.07, 0.61)**
PFHxS	**-0.22 (-0.35, -0.08)**	**-0.23 (-0.39, -0.06)**	**-0.27 (-0.47, -0.08)**	-0.18 (-0.37, 0.02)
MeFOSAA	-0.06 (-0.17, 0.05)	-0.01 (-0.13, 0.11)	-0.05 (-0.20, 0.11)	-0.09 (-0.25, 0.07)
PFNA	0.10 (-0.09, 0.29)	0.07 (-0.14, 0.28)	0.03 (-0.24, 0.30)	0.21 (-0.07, 0.48)
C) Change in truncal fat mass index[d] β (95% CI)				
	n = 417	*n* = 337	*n* = 205	*n* = 212
PFOA	-0.09 (-0.23, 0.04)	**-0.17 (-0.31, -0.03)**	-0.10 (-0.29, 0.09)	-0.04 (-0.22, 0.15)
PFOS	**-0.14 (-0.24, -0.03)**	**-0.15 (-0.25, -0.04)**	-0.13 (-0.27, 0.02)	-0.14 (-0.28, 0.00)
PFDA	0.04 (-0.05, 0.13)[e]	0.02 (-0.08, 0.11)	-0.03 (-0.15, 0.10)	**0.14 (0.02, 0.27)**
PFHxS	**-0.09 (-0.16, -0.03)**	**-0.09 (-0.17, -0.02)**	**-0.12 (-0.21, -0.02)**	-0.08 (-0.17, 0.01)
MeFOSAA	-0.03 (-0.08, 0.03)	0.00 (-0.06, 0.06)	-0.02 (-0.10, 0.06)	-0.04 (-0.11, 0.04)
PFNA	0.05 (-0.04, 0.15)	0.04 (-0.06, 0.13)	0.03 (-0.10, 0.16)	0.09 (-0.04, 0.22)
D) Change in total lean mass index[d] β (95% CI)				
	n = 417	*n* = 337	*n* = 205	*n* = 212
PFOA	**-0.33 (-0.52, -0.13)**	**-0.38 (-0.60, -0.15)**	**-0.27 (-0.54, -0.01)**	**-0.33 (-0.63, -0.04)**
PFOS	**-0.21 (-0.36, -0.06)**	**-0.26 (-0.43, -0.09)**	**-0.23 (-0.43, -0.02)**	-0.19 (-0.42, 0.03)
PFDA	**-0.17 (-0.3, -0.04)**	**-0.16 (-0.32, -0.01)**	**-0.21 (-0.38, -0.04)**	-0.11 (-0.31, 0.09)
PFHxS	**-0.11 (-0.21, -0.02)**	**-0.17 (-0.30, -0.05)**	**-0.14 (-0.27, -0.01)**	-0.08 (-0.23, 0.06)
MeFOSAA	-0.02 (-0.09, 0.06)	0.01 (-0.08, 0.10)	-0.01 (-0.12, 0.09)	-0.03 (-0.15, 0.09)
PFNA	-0.03 (-0.16, 0.11)	0.00 (-0.15, 0.16)	-0.04 (-0.22, 0.14)	0.01 (-0.19, 0.21)

Abbreviations: BMI, body mass index; CI, confidence interval; PFOA, perfluorooctanoate; PFOS, perfluorooctane sulfonate; PFDA, perfluorodecanoate; PFHxS, perfluorohexane sulfonate; MeFOSAA, N-methyl-perfluorooctane sulfonamido acetate; PFNA, perfluorononanoate.
Note: bold text denotes 95% CI does not cross the null.
[a] Adjusted for maternal characteristics (age at enrollment, education, and gestational weight gain) and child characteristics (age at mid-childhood visit, race/ethnicity, sex, and calendar year of blood draw).

[b] Overall model additionally adjusted for mother's early pregnancy plasma concentrations of PFAS
[c] Adjusted for maternal characteristics (age at enrollment, education, and gestational weight gain) and child characteristics (age at mid-childhood visit, race/ethnicity, and calendar year of blood draw).
[d] Measured by dual-energy X-ray absorptiometry in kg/m^2
[e] Statistically significant effect modification by sex

Supplemental Table 4. Covariate-adjusted[a] change in body mass index (BMI) Z-score, total fat mass index, truncal fat mass index, and lean mass index per doubling of plasma per- and polyfluoroalkyl substance (PFAS) isomer concentrations from mid-childhood to early adolescence.

Mid-childhood PFAS isomers[b]	Change in BMI Z-score	Change in total fat mass index (kg/m^2)	Change in truncal fat mass index (kg/m^2)	Change in lean mass index (kg/m^2)
		β (95% CI)		
n-PFOS	-0.06 (-0.12, 0.00)	**-0.31 (-0.52, -0.10)**	**-0.13 (-0.23, -0.03)**	**-0.19 (-0.34, -0.05)**
Sm-PFOS	-0.06 (-0.12, 0.00)	**-0.32 (-0.53, -0.10)**	**-0.14 (-0.24, -0.04)**	**-0.22 (-0.37, -0.07)**
n-PFOA	-0.02 (-0.10, 0.07)	-0.19 (-0.48, 0.11)	-0.10 (-0.24, 0.04)	**-0.35 (-0.55, -0.14)**

[a] Adjusted for maternal characteristics (age at enrollment, education, and gestational weight gain) and child characteristics (age at mid-childhood visit, race/ethnicity, sex, and calendar year of blood draw).
[b] Log_2-transformed
Note: bold text denotes 95% CI does not cross the null.

Supplemental Table 5. Covariate-adjusted[a] change in subcutaneous and visceral fat mass indices from mid-childhood to early adolescence per doubling of plasma per- and polyfluoroalkyl substance (PFAS) concentrations

Mid-childhood PFAS[b]	Change in subcutaneous fat mass index (g/m^2)	Change in visceral fat mass index (g/m^2)
	β (95% CI)	
PFOA	-6.96 (-26.98, 13.06)	2.28 (-2.44, 7.00)
PFOS	**-17.26 (-32.25, -2.27)**	-1.54 (-5.10, 2.02)
PFDA	8.00 (-5.25, 21.25)	**4.44 (1.34, 7.55)**
PFHxS	**-12.07 (-21.70, -2.43)**	-2.19 (-4.47, 0.09)
MeFOSAA	-4.13 (-11.90, 3.64)	-0.09 (-1.93, 1.74)
PFNA	8.96 (-4.62, 22.53)	**3.89 (0.70, 7.07)**

[a] Adjusted for maternal characteristics (age at enrollment, education, and gestational weight gain) and child characteristics (age at mid-childhood visit, race/ethnicity, sex, and calendar year of blood draw).
[b] Log_2-transformed
Note: bold text denotes 95% CI does not cross the null. Mean (standard deviation [SD]) subcutaneous fat mass index in mid-childhood was 297.51 (203.90) g/m^2; mean (SD) visceral fat mass index in mid-childhood was 78.34 (41.73) g/m^2.

Supplemental Figure 1. Conceptual model of variables potentially confounding the relationship between per- and polyfluoroalkyl substances in mid-childhood and body composition from mid-childhood to early adolescence.