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## **Supplemental Material**

### **Perfluoroalkyl Acids in Maternal Serum and Indices of Fetal Growth: The Aarhus Birth Cohort**

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**Figure S2.** Directed acyclic graph illustrating the association between perfluoroalkyl acid (PFAA) exposure and preterm birth. The illustration also applies to the continuous gestational age outcome. In the main analyses we conditioned on the variables marked with white circles. According to this graph it was not necessary to condition on the variables marked with grey circles. Figure made by use of daggity.net (Textor et al. 2011).

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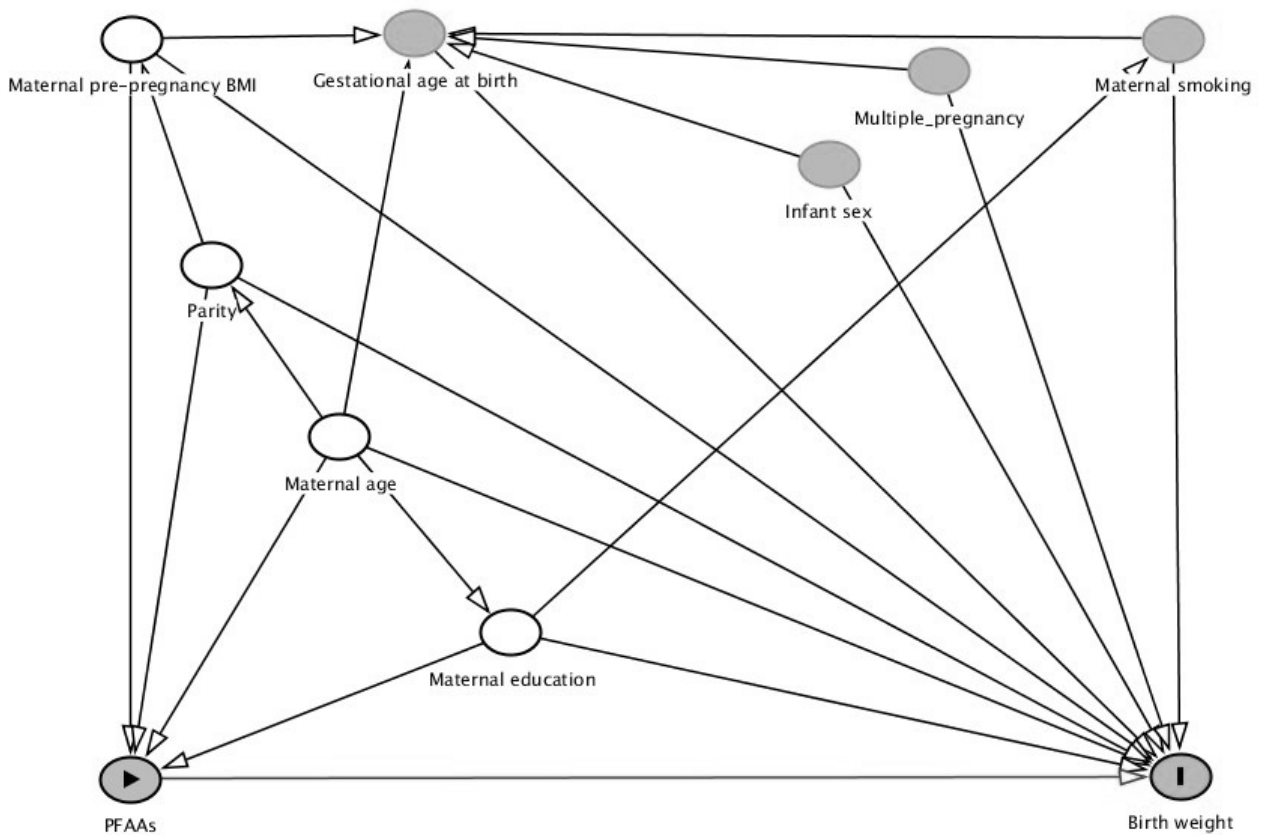
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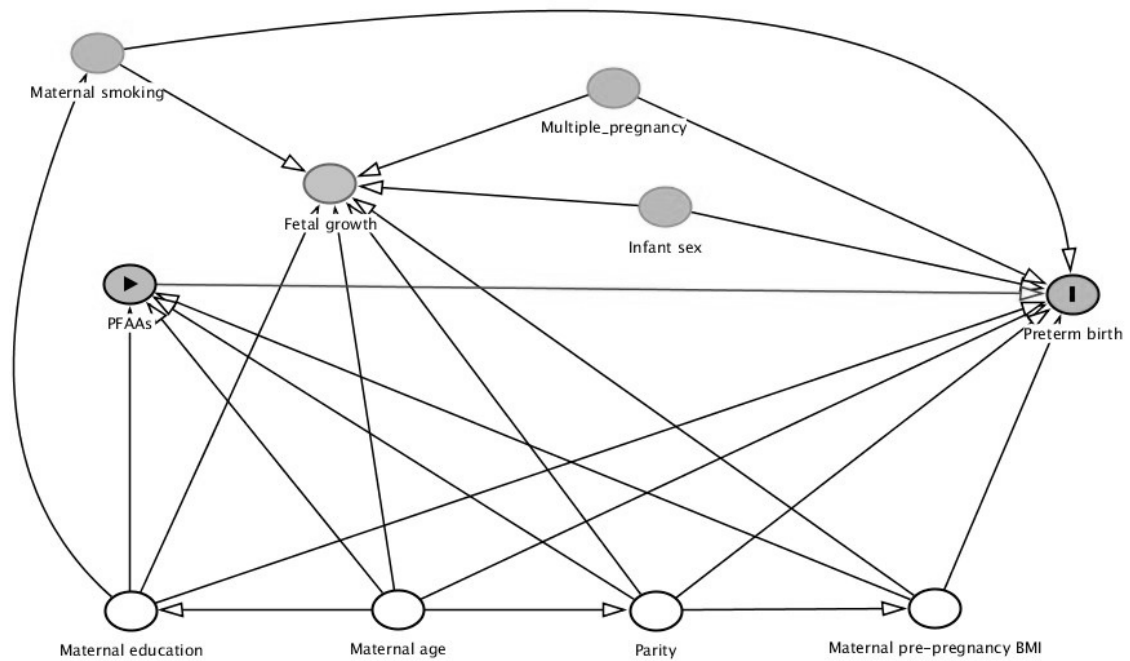
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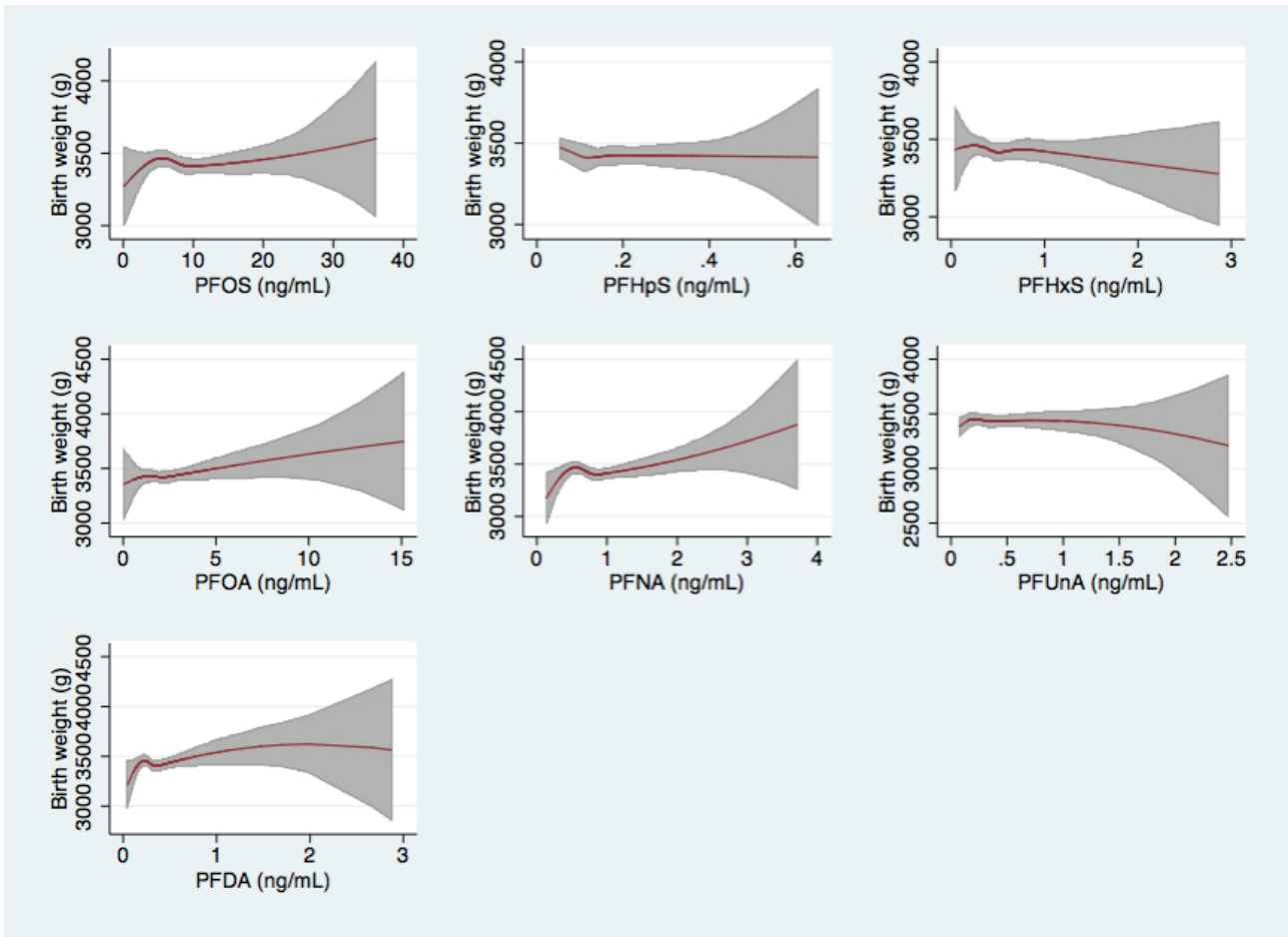
## **References**



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**Table S1.** Perfluoroalkyl acid abbreviations, limits of quantification (LOQ), and levels above the LOQ for compounds not included in the study of 1507 women from the Aarhus Birth Cohort, 2008-2013.

<b>Full name</b>	<b>Abbreviation</b>	<b>LOQ ng/mL</b>	<b>% above LOQ</b>
Perfluorobutane sulfonate	PFBS	0.07	1
Perfluorodecane sulfonate	PFDS	0.37	0
Perfluorooctane sulfonamide	PFOSA	1.19	0
Perfluoropentanoic acid	PFPeA	0.19	6
Perfluorohexanoic acid	PFHxA	0.03	2
Perfluoroheptanoic acid	PFHpA	0.05	26
Perfluorododecanoic acid	PFDoA	0.41	5
Perfluorotridecanoic acid	PFTTrA	0.41	0.3
Perfluorotetradecanoic acid	PFTTeA	0.41	0

**Table S2.** Pearson's correlations for perfluoroalkyl acids in 1507 women from the Aarhus Birth Cohort, 2008-2013.

	PFHxS	PFHpS	PFOS	PFOA	PFNA	PFDA
PFHpS	0.47					
PFOS	0.38	0.80				
PFOA	0.24	0.38	0.40			
PFNA	0.20	0.39	0.46	0.82		
PFDA	0.15	0.3	0.38	0.71	0.85	
PFUnA	0.14	0.31	0.36	0.21	0.40	0.60

See PFAA abbreviations in Table 1 in the main document.

$p < 0.001$  for all correlations.

**Table S3.** Levels of perfluoroalkyl acids, birth length (n= 1499) and head circumference at birth (n=1494) in the Aarhus Birth Cohort, 2008-2013.

PFAA	Exposure scale	Birth length (cm)			Head circumference (cm)		
		Median (IQR)	Crude	Adjusted	Median (IQR)	Crude	Adjusted
PFHxS	Q1	52 (50-53)	Ref.	Ref.	35 (34-36)	Ref.	Ref.
	Q2	52 (50-53)	0.1	0.1 (-0.3, 0.4)	35 (34-36)	-0.1	-0.2 (-0.4, 0.1)
	Q3	52 (50-53)	-0.1	-0.1 (-0.5, 0.3)	35 (34-36)	-0.2	-0.2 (-0.5, 0.0)
	Q4	52 (50-53)	-0.2	-0.2 (-0.5, 0.2)	35 (34-36)	-0.2	-0.2 (-0.5, 0.1)
	Per IQR (0.3 ng/mL)		0.0	0.0 (-0.1, 0.1)		-0.1	0.0 (-0.1, 0.0)
	Per 0.1 ng/mL		0.0	0.0 (0.0, 0.0)		0.0	0.0 (0.0, 0.0)
PFHpS	Q1	52 (51-53)	Ref.	Ref.	35 (34-36)	Ref.	Ref.
	Q2	52 (50-53)	-0.3	-0.3 (-0.7, 0.03)	35 (34-36)	-0.1	-0.1 (-0.3, 0.2)
	Q3	52 (50-53)	-0.1	-0.2 (-0.5, 0.2)	35 (34-36)	0.0	0.0 (-0.2, 0.2)
	Q4	52 (50-53)	-0.2	-0.2 (-0.5, 0.2)	35 (34-36)	0.0	0.0 (-0.3, 0.2)
	Per IQR (0.1 ng/mL)		0.0	0.0 (-0.2, 0.1)		0.0	0.0 (-0.1, 0.1)
	Per 0.1 ng/mL		0.0	0.0 (-0.2, 0.1)		0.0	0.0 (-0.1, 0.1)
PFOS	Q1	52 (50-53)	Ref.	Ref.	35 (34-36)	Ref.	Ref.
	Q2	52 (50-53)	-0.3	-0.3 (-0.7, 0.0)	35 (34-36)	-0.2	-0.2 (-0.5, 0.0)
	Q3	52 (50-53)	-0.1	-0.1 (-0.4, 0.3)	35 (34-36)	-0.1	-0.1 (-0.4, 0.1)
	Q4	52 (50-53)	-0.1	-0.1 (-0.5, 0.2)	35 (34-36)	-0.1	-0.1 (-0.3, 0.2)
	Per IQR (4.8 ng/mL)		0.0	0.0 (-0.1, 0.2)		0.0	0.0 (-0.1, 0.1)
	Per 0.1 ng/mL		0.0	0.0 (0.0, 0.0)		0.0	0.0 (0.0, 0.0)
PFOA	Q1	52 (50-53)	Ref.	Ref.	35 (34-36)	Ref.	Ref.
	Q2	52 (50-53)	-0.1	0.0 (-0.4, 0.4)	35 (34-36)	0.0	0.0 (-0.2, 0.3)
	Q3	52 (50-53)	0.0	0.0 (-0.4, 0.4)	35 (34-36)	0.1	0.1 (-0.2, 0.4)
	Q4	52 (50-53)	0.0	0.1 (-0.3, 0.4)	35 (34-36)	0.1	0.1 (-0.1, 0.4)
	Per IQR (1.1 ng/mL)		0.1	0.1 (-0.1, 0.2)		0.1	0.1 (0.0, 0.2)
	Per 0.1 ng/mL		0.0	0.0 (0.0, 0.0)		0.0	0.0 (0.0, 0.0)
PFNA	Q1	52 (50-53)	Ref.	Ref.	35 (34-36)	Ref.	Ref.
	Q2	52 (50-53)	0.1	0.1 (-0.3, 0.4)	35 (34-36)	0.2	0.1 (-0.1, 0.4)
	Q3	52 (50-53)	-0.2	-0.2 (-0.6, 0.2)	35 (34-36)	-0.2	-0.2 (-0.4, 0.1)
	Q4	52 (50-53)	0.1	0.1 (-0.3, 0.4)	35 (34-36)	0.2	0.2 (-0.1, 0.4)
	Per IQR (0.4 ng/mL)		0.0	0.0 (-0.1, 0.1)		0.1	0.1 (0.0, 0.2)
	Per 0.1 ng/mL		0.0	0.0 (0.0, 0.0)		0.0	0.0 (0.0, 0.0)
PFDA	Q1	52 (50-53)	Ref.	Ref.	35 (34-36)	Ref.	Ref.
	Q2	52 (50-53)	0.0	0.0 (-0.4, 0.3)	35 (34-36)	0.0	-0.1 (-0.3, 0.2)
	Q3	52 (50-53)	0.2	0.2 (-0.2, 0.6)	35 (34-36)	-0.1	-0.1 (-0.3, 0.2)
	Q4	52 (50-53)	0.1	0.1 (-0.3, 0.5)	35 (34-36)	0.2	0.2 (-0.1, 0.5)
	Per IQR (0.2 ng/mL)		0.0	0.1 (-0.1, 0.2)		0.1	0.1 (0.0, 0.2)
	Per 0.1 ng/mL		0.0	0.0 (0.0, 0.1)		0.1	0.1 (0.1, 0.1)



<b>PFUnA</b>	Q1	52 (50-53)	Ref.	Ref.	35 (34-36)	Ref.	Ref.
	Q2	52 (50-53)	0.1	0.2 (-0.2, 0.6)	35 (34-36)	0.0	0.0 (-0.2, 0.3)
	Q3	52 (50-53)	0.2	0.3 (-0.1, 0.6)	35 (34-36)	0.0	0.0 (-0.2, 0.3)
	Q4	52 (50-53)	0.1	0.2 (-0.2, 0.6)	35 (34-36)	-0.1	0.0 (-0.2, 0.3)
	Per IQR (0.2 ng/mL)		0.0	0.1 (-0.1, 0.2)		0.0	0.0 (-0.1, 0.1)
	Per 0.1 ng/mL		0.0	0.0 (0.0, 0.1)		0.0	0.0 (0.0, 0.1)

Abbreviations: Quartile (Q), interquartile range (IQR), reference (Ref). See PFAA abbreviations in Table 1 in the main document. Adjusted for maternal age, pre-pregnancy body mass index, and educational level.

**Table S4.** Levels of perfluoroalkyl acids and gestational length at birth or preterm birth in 1507 children from the Aarhus Birth Cohort, 2008-2013.

PFAA	Exposure scale	Gestational length (weeks)			OR for Preterm birth	
		Median (IQR)	Crude	Adjusted	Crude	Adjusted
<b>PFHxS</b>	Q1	40 (39-41)	Ref.	Ref.	Ref.	Ref.
	Q2	40 (39-41)	0.0	0.0 (-0.3, 0.2)	0.70	0.72 (0.38, 1.37)
	Q3	40 (39-41)	0.0	0.0 (-0.3, 0.2)	0.98	0.97 (0.54, 1.77)
	Q4	40 (39-41)	0.1	0.1 (-0.2, 0.4)	0.70	0.68 (0.35, 1.31)
	Per IQR (0.3 ng/mL)		0.0	0.0 (0.0, 0.1)	0.89	0.87 (0.68, 1.13)
	Per 0.1 ng/mL		0.0	0.0 (0.0, 0.0)	0.96	0.95 (0.87, 1.05)
<b>PFHpS</b>	Q1	40 (39-41)	Ref.	Ref.	Ref.	Ref.
	Q2	40 (39-41)	-0.2	-0.2 (-0.5, 0.1)	1.10	1.10 (0.61, 1.97)
	Q3	40 (39-41)	0.1	0.1 (-0.2, 0.3)	0.66	0.67 (0.35, 1.31)
	Q4	40 (39-41)	0.0	0.0 (-0.2, 0.3)	0.76	0.76 (0.40, 1.46)
	Per IQR (0.1 ng/mL)		0.0	0.0 (-0.1, 0.1)	0.93	0.93 (0.65, 1.32)
	Per 0.1 ng/mL		0.0	0.0 (-0.1, 0.1)	0.93	0.93 (0.68, 1.29)
<b>PFOS</b>	Q1	40 (39-41)	Ref.	Ref.	Ref.	Ref.
	Q2	40 (39-41)	-0.1	-0.1 (-0.4, 0.1)	0.94	0.96 (0.53, 1.74)
	Q3	40 (39-41)	0.1	0.0 (-0.2, 0.3)	0.64	0.65 (0.34, 1.26)
	Q4	40 (39-41)	0.0	0.0 (-0.3, 0.2)	0.82	0.82 (0.44, 1.53)
	Per IQR (4.8 ng/mL)		0.0	0.0 (-0.1, 0.1)	0.84	0.85 (0.60, 1.21)
	Per 0.1 ng/mL		0.0	0.0 (0.0, 0.0)	1.00	1.00 (0.99, 1.00)
<b>PFOA</b>	Q1	40 (39-41)	Ref.	Ref.	Ref.	Ref.
	Q2	40 (39-41)	0.0	0.0 (-0.3, 0.2)	0.53	0.51 (0.27, 0.98)
	Q3	40 (39-41)	0.1	0.1 (-0.2, 0.3)	0.66	0.67 (0.36, 1.25)
	Q4	40 (39-41)	0.1	0.1 (-0.2, 0.4)	0.77	0.77 (0.42, 1.39)
	Per IQR (1.1 ng/mL)		0.1	0.1 (0.0, 0.2)	0.86	0.87 (0.66, 1.14)
	Per 0.1 ng/mL		0.0	0.0 (0.0, 0.0)	0.99	0.99 (0.96, 1.01)
<b>PFNA</b>	Q1	40 (39-41)	Ref.	Ref.	Ref.	Ref.
	Q2	40 (39-41)	0.1	0.1 (-0.2, 0.3)	0.83	0.84 (0.44, 1.60)
	Q3	40 (39-41)	-0.1	-0.1 (-0.4, 0.1)	0.86	0.87 (0.46, 1.65)
	Q4	40 (39-41)	0.0	0.0 (-0.2, 0.3)	1.17	1.18 (0.65, 2.16)
	Per IQR (0.4 ng/mL)		0.0	0.0 (0.0, 0.1)	0.98	0.99 (0.81, 1.20)
	Per 0.1 ng/mL		0.0	0.0 (0.0, 0.0)	0.99	1.00 (0.94, 1.05)
<b>PFDA</b>	Q1	40 (39-41)	Ref.	Ref.	Ref.	Ref.
	Q2	40 (39-41)	0.1	0.1 (-0.2, 0.3)	0.81	0.83 (0.44, 1.58)
	Q3	40 (39-41)	0.1	0.1 (-0.2, 0.3)	0.82	0.82 (0.43, 1.57)
	Q4	40 (39-41)	0.1	0.1 (-0.2, 0.3)	1.06	1.06 (0.58, 1.92)
	Per IQR (0.2 ng/mL)		0.0	0.0 (0.0, 0.1)	0.98	0.98 (0.81, 1.18)
	Per 0.1 ng/mL		0.0	0.0 (0.0, 0.1)	0.99	0.99 (0.89, 1.10)
<b>PFUnA</b>	Q1	40 (39-41)	Ref.	Ref.	Ref.	Ref.
	Q2	40 (39-41)	0.0	0.0 (-0.2, 0.3)	0.92	0.91 (0.50, 1.67)
	Q3	40 (39-41)	0.1	0.1 (-0.2, 0.3)	0.85	0.84 (0.44, 1.59)
	Q4	40 (39-41)	0.1	0.1 (-0.1, 0.4)	0.85	0.81 (0.43, 1.51)
	Per IQR (0.2 ng/mL)		0.0	0.0 (-0.1, 0.1)	0.95	0.93 (0.75, 1.16)
	Per 0.1 ng/mL		0.0	0.0 (0.0, 0.1)	0.98	0.97 (0.89, 1.06)

Abbreviations: Quartile (Q), interquartile range (IQR), odds ratio (OR). See PFAA abbreviations in Table 1 in the main document. Preterm birth was defined at births before 37 gestational weeks and 0 days.

## References

Textor J, Hardt J, Knüppel S. 2011. DAGitty: a graphical tool for analyzing causal diagrams. *Epidemiology* 22:745; doi:10.1097/EDE.0b013e318225c2be.