SUPPLEMENTAL MATERIALS

Associations of per- and polyfluoroalkyl substances (PFAS) with glucose tolerance during pregnancy in the Project Viva cohort

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Table S1. Distributions of plasma PFAS concentrations (ng/mL) measured during early pregnancy (median 9.7 weeks) in the study population (n=1,540) in 1999-2002.

PFAS	% detection	GM (GSD)	Min	25%	50%	75%	Max
PFOS	99.9	25.5 (1.7)	<LOD	18.8	25.7	34.9	185.0
PFOA	100	5.7 (1.6)	0.3	4.2	5.9	7.9	36.7
PFHxS	99.3	2.5 (2.1)	<LOD	1.6	2.5	3.8	74.5
PFNA	98.6	0.6 (1.7)	<LOD	0.5	0.7	0.9	6.0
EtFOSAA	99.7	1.2 (2.1)	<LOD	0.7	1.2	1.9	33.6
MeFOSAA	100	1.9 (2.0)	<LOD	1.3	1.9	3.2	29.7

Abbreviations: GM, geometric mean; GSD, geometric standard deviation; PFAS, per- and polyfluoroalkyl substances; PFOS, perfluorooctane sulfonate; PFOA, perfluorooctanoate; PFHxS, perfluorohexane sulfonate; PFNA, perfluorononanoate; EtFOSAA, 2-(N-ethyl-perfluorooctane sulfonamide) acetate; MeFOSAA, 2-(N-methyl-perfluorooctane sulfonamide) acetate.
Limits of detection: PFOS= 0.2 ng/mL, all other PFAS= 0.1 ng/mL

Table S2. Adjusted[a] ORs (95% CIs) for categories of glucose tolerance per unit increase in plasma ln-PFAS concentration (n=1,540)

PFAS	Normal (n=1,284)	IH (n=126)	IGT (n=45)	GDM (n=85)
lnPFOS	1 (Ref)	0.9 (0.6, 1.2)	1.0 (0.5, 1.7)	1.3 (0.8, 2.1)
lnPFOA	1 (Ref)	1.0 (0.7, 1.5)	0.9 (0.5, 1.6)	1.0 (0.6, 1.6)
lnPFHxS	1 (Ref)	1.2 (0.9, 1.6)	0.8 (0.6, 1.3)	0.9 (0.6, 1.3)
lnPFNA	1 (Ref)	1.2 (0.8, 1.7)	1.1 (0.6, 2.0)	0.9 (0.6, 1.5)
lnEtFOSAA	1 (Ref)	0.9 (0.7, 1.1)	1.2 (0.8, 1.8)	1.3 (0.9, 1.8)
lnMeFOSAA	1 (Ref)	1.0 (0.8, 1.4)	1.0 (0.6, 1.6)	1.1 (0.8, 1.7)

Abbreviations: PFAS, per- and polyfluoroalkyl substances; IH, isolated hyperglycemia, IGT, impaired glucose tolerance; GDM, gestational diabetes mellitus; PFOS, perfluorooctane sulfonate; PFOA, perfluorooctanoate; PFHxS, perfluorohexane sulfonate; PFNA, perfluorononanoate; EtFOSAA, 2-(N-ethyl-perfluorooctane sulfonamide) acetate; MeFOSAA, 2-(N-methyl-perfluorooctane sulfonamide) acetate.

[a]Adjusted for maternal age (continuous), pre-pregnancy BMI (continuous), prior history of GDM/parity, race/ethnicity, smoking, education

Table S3. BKMR estimated effects of individual PFAS concentrations on blood glucose levels (mg/dL) 1-hour post 50-g non-fasting GCT (n=1,530)

PFAS	Beta (95% CI)[a]
PFOS	6.2 (1.1, 11.3)
PFOA	-0.7 (-4.8, 3.3)
PFHxS	-0.3 (-1.9, 1.4)
PFNA	-0.2 (-3.1, 2.7)
EtFOSAA	-0.7 (-3.7, 2.3)
MeFOSAA	-0.4 (-4.3, 3.5)

Abbreviations: PFAS, per- and polyfluoroalkyl substances; IH, isolated hyperglycemia, IGT, impaired glucose tolerance; GDM, gestational diabetes mellitus; PFOS, perfluorooctane sulfonate; PFOA, perfluorooctanoate; PFHxS, perfluorohexane sulfonate; PFNA, perfluorononanoate; EtFOSAA, 2-(N-ethyl-perfluorooctane sulfonamide) acetate; MeFOSAA, 2-(N-methyl-perfluorooctane sulfonamide) acetate.

[a] Beta estimates represent differences in glucose levels (mg/dl) for a change in individual PFAS concentration from the 25th to 75th percentile, holding all other PFAS at their median concentrations.

Adjusted for maternal age (continuous), pre-pregnancy BMI (continuous), prior history of GDM/parity, race/ethnicity, smoking, education.

Figure S1. Spearman correlation coefficient matrix for plasma PFAS concentrations measured during early pregnancy (n=1,540). All p-values <0.0001. Abbreviations: PFAS, per- and polyfluoroalkyl substances; PFOS, perfluorooctane sulfonate; PFOA, perfluorooctanoate; PFHxS, perfluorohexane sulfonate; PFNA, perfluorononanoate; EtFOSAA, 2-(N-ethyl-perfluorooctane sulfonamide) acetate; MeFOSAA, 2-(N-methyl-perfluorooctane sulfonamide) acetate.
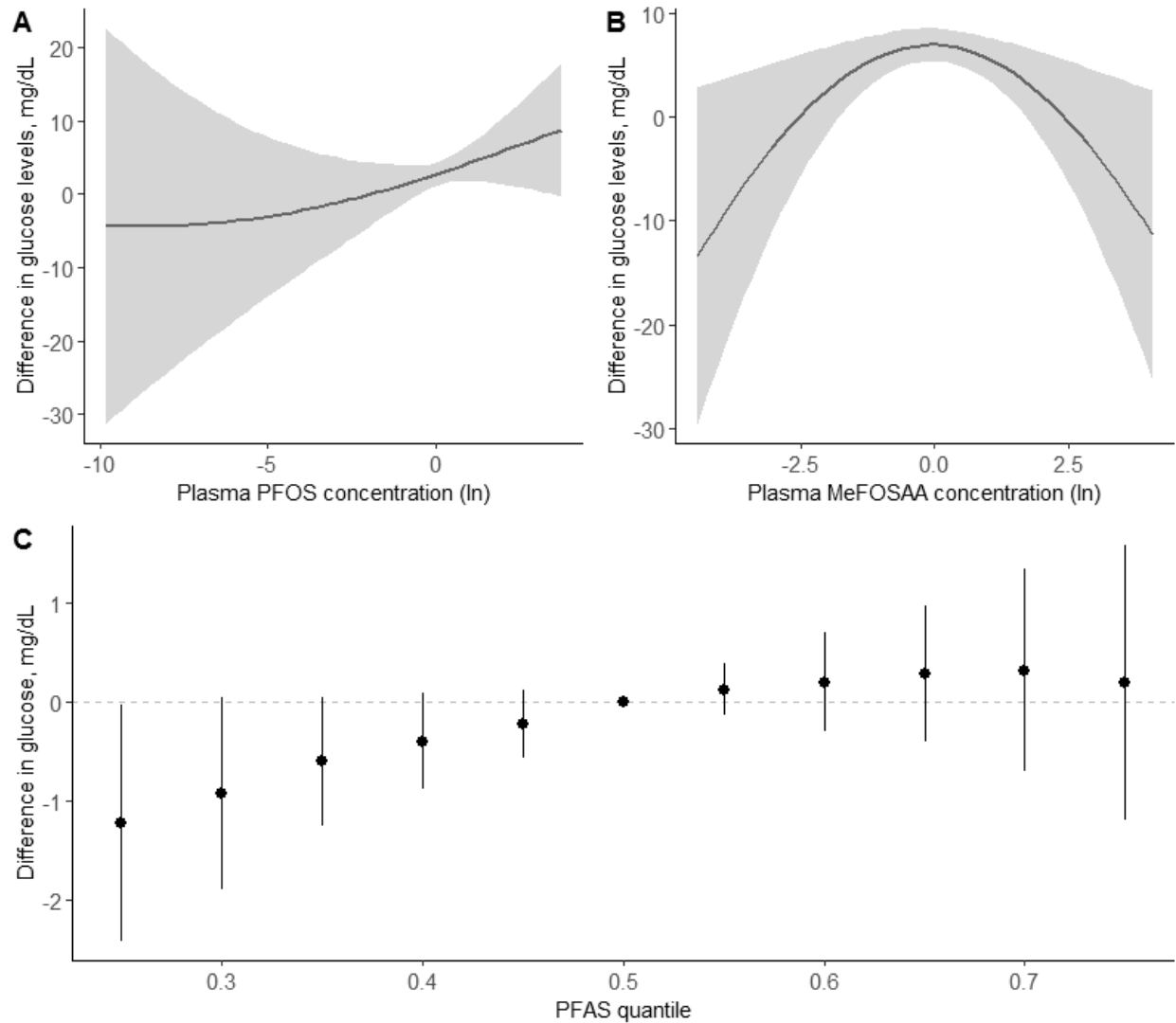
Figure S2. Combined effects of the PFAS mixture on blood glucose levels (n=1,533) estimated by Bayesian Kernel Machine Regression (BKMR), adjusting for maternal age (continuous), pre-pregnancy BMI (continuous), prior history of GDM/parity, race/ethnicity, smoking, education. Univariate exposure-response function and 95% confidence bands for (A) PFOS and (B) MeFOSAA holding all other PFAS at the median. (C) Overall effect of the PFAS mixture. This plot shows the estimated difference in blood glucose levels and 95% credible intervals when all PFAS concentrations are held at a certain percentile compared to when PFAS concentrations are held at the median. Abbreviations: PFAS, per- and polyfluoroalkyl substances; PFOS, perfluorooctane sulfonate; PFOA, perfluorooctanoate; PFHxS, perfluorohexane sulfonate; PFNA, perfluorononanoate; EtFOSAA, 2-(N-ethyl-perfluorooctane sulfonamide) acetate; MeFOSAA, 2-(N-methyl-perfluorooctane sulfonamide) acetate.