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Supplemental Material, Table S1**.** Criteria (BIC and $2\log_e(B_{10})$) for evaluating trajectory fit.

Null vs. Alternative model [number of trajectories]	**BIC**	$\mathbf{2\log_e(B_{10}) \approx 2(\Delta BIC)}$
BDE-47		
2 vs **3**	-352.01 vs -343.89	**16.24**
3 vs 4	-343.89 vs -343.97	-0.16
4 vs 5	-343.97 vs -350.78	-13.62

$2\log_e(B_{10})$: interpreted as the degree of evidence favoring the alternative model. Bold, red font indicates the selected model.

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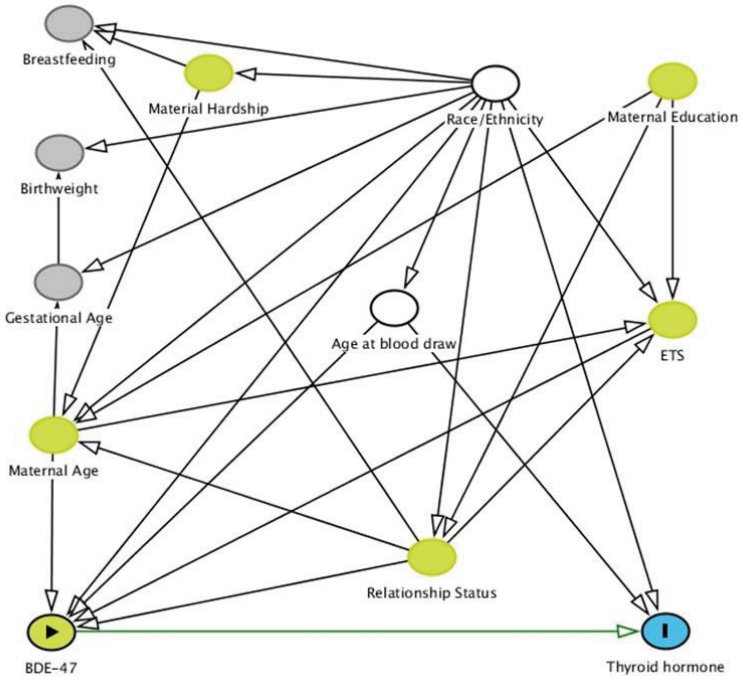

Supplemental Material, Figure S2. Directed Acyclic Graph for covariate selection.

The green line represents the causal path between exposure (BDE-47) and outcome (thyroid parameter). Green/yellow circles represent ancestors of the exposure, grey circles represent variables not on a biasing path but related to an ancestor of exposure, white circles represent ancestors of the exposure and the outcome that are sufficient to close biasing paths when adjusted for. As illustrated, adjusting for ethnicity and age at blood draw is sufficient to estimate the unconfounded association between BDE-47 and thyroid hormone parameters. We additionally examined sex and parity, however, these variables are excluded from the diagram as they were not associated with the exposure, the outcome, or any ancestor of these variables. Diagram generated in DAGitty v2.3 available at: http://www.dagitty.net/

Supplemental Material, Table S3. Percentiles of plasma BDE-47 (ng/g lipid) concentrations measured in children enrolled in the CCCEH cohort.

	N	% <LOD	0	1	5	10	25	50	75	90	95	99	100
Cord	327	20	1.3	2.7	3.2	3.9	5.6	12.3	29.0	63.7	98.5	228.2	364.8
Age 2	56	0	5.6	5.4	7.2	8.1	15.8	28.2	103.9	149.0	272.1	400.9	400.9
Age 3	115	1	4.6	4.6	6.2	7.7	14.6	31.3	67.8	120.0	207.6	291.2	350.9

Values for plasma BDE-47 concentrations below the sample-specific limit of detection (LOD) were imputed using a distribution based multiple imputation approach as described in the manuscript.

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Supplemental Material, **Table S4**. Associations (β, 95% CI) between BDE-47 trajectories (ng/g lipid) and serum thyroid parameters, all models n=185 children and 223 observations.

	Log_{10}TSH (μIU/mL)	Free T_4 (pmol/L)	Total T_4 (nmol/L)
Age & ethnicity-adjusted			
Persistent low	Reference	Reference	Reference
Prenatal high	-0.08 (-0.15, -0.01)	-0.20 (-0.92, 0.52)	-0.61 (-10.66, 9.44)
Postnatal high	-0.09 (-0.16, -0.02)	-0.65 (-1.37, 0.07)	-4.80 (-13.11, 3.51)
Age-adjusted only			
Persistent low	Reference	Reference	Reference
Prenatal high	-0.10 (-0.16, -0.03)	-0.21 (-0.94, 0.52)	1.14 (-8.96, 11.24)
Postnatal high	-0.10 (-0.17, -0.03)	-0.66 (-1.38, 0.07)	-4.36 (-12.74, 4.02)
Adjusted all covariates[a]			
Persistent low	Reference	Reference	Reference
Prenatal high	-0.09 (-0.16, -0.01)	-0.04 (-0.78, 0.70)	0.76 (-8.56, 10.09)
Postnatal high	-0.09 (-0.16, -0.02)	-0.66 (-1.35, 0.02)	-5.39 (-13.87, 3.09)

[a]Child age at blood draw, ethnicity, gender, gestational age, birthweight, maternal age at delivery, employment, education, marital status, parity, material hardship, prenatal environmental tobacco smoke exposure, breastfeeding history.

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Supplemental Material, **Table S5**. Age- and ethnicity-adjusted associations (β, 95% CI) between BDE-47 trajectories (ng/g lipid) and serum thyroid parameters measured at 3 years, 5 years, or 3 and 5 years

	Log_{10}TSH (μIU/mL)	Free T_4 (pmol/L)	Total T_4 (nmol/L)
Age 3 years (n=150)			
Persistent low	Reference	Reference	Reference
High decreasing	-0.05 (-0.14, 0.03)	-0.29 (-1.20, 0.62)	-1.88 (-12.37, 8.60)
Low increasing	-0.06 (-0.14, 0.02)	-0.38 (-1.19, 0.42)	-3.37 (-12.63, 5.89)
Age 5 years (n=73)			
Persistent low	Reference	Reference	Reference
High decreasing	-0.14 (-0.26, -0.03)	-0.13 (-1.42, 1.16)	-0.52 (-18.91, 17.87)
Low increasing	-0.17 (-0.28, -0.06)	-1.45 (-2.63, -0.28)	-6.90 (-23.68, 9.88)
GEE (3 & 5 years)[a]			
Persistent low	Reference	Reference	Reference
High decreasing	-0.08 (-0.15, -0.01)	-0.20 (-0.92, 0.52)	-0.61 (-10.66, 9.44)
Low increasing	-0.09 (-0.16, -0.02)	-0.65 (-1.37, 0.07)	-4.80 (-13.11, 3.51)

[a]n=185 children and 223 observations.

Supplemental Material, **Table S6**. Age- and ethnicity-adjusted associations (β, 95% CI) between continuous BDE-47 (ng/g lipid) and serum thyroid parameters measured between 3 and 5 years using the GEE approach.

Age of BDE-47 sample	Log_{10}TSH (μIU/mL)	Free T_4 (pmol/L)	Total T_4 (nmol/L)
Cord plasma[a]	-0.05 (-0.10, 0.01)	-0.04 (-0.08, 0.00)	-0.26 (-0.87, 0.36)
Age 3 year plasma[b]	-0.01 (-0.10, 0.09)	-0.01 (-0.10, 0.07)	0.56 (-0.23, 1.35)

[a]n=223 observations, n=185 subjects; [b]n=72 observations, n=60 subjects.

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Supplemental Material, **Table S7**. Exposure (BDE-47 trajectory) and outcome (thyroid hormone parameters) characteristics of included children, stratified by sex

	Boys	Girls
BDE-47 trajectory		
Persistent low	37 (44)	40 (40)
High decreasing	21 (25)	25 (25)
Low increasing	27 (32)	35 (35)
TSH (µIU/mL)*		
Age 3	2.4±0.1	2.3±0.1
Age 5	2.1±0.2	2.1±0.2
Free T_4 (pmol/L)		
Age 3	18.1±2.1	18.4±2.3
Age 5	18.1±2.4	18.2±2.2
Total T_4 (nmol/L)		
Age 3	139.5±27.9	141.5±23.0
Age 5	151.5±38.0	142.1±25.3
*Geometric mean		

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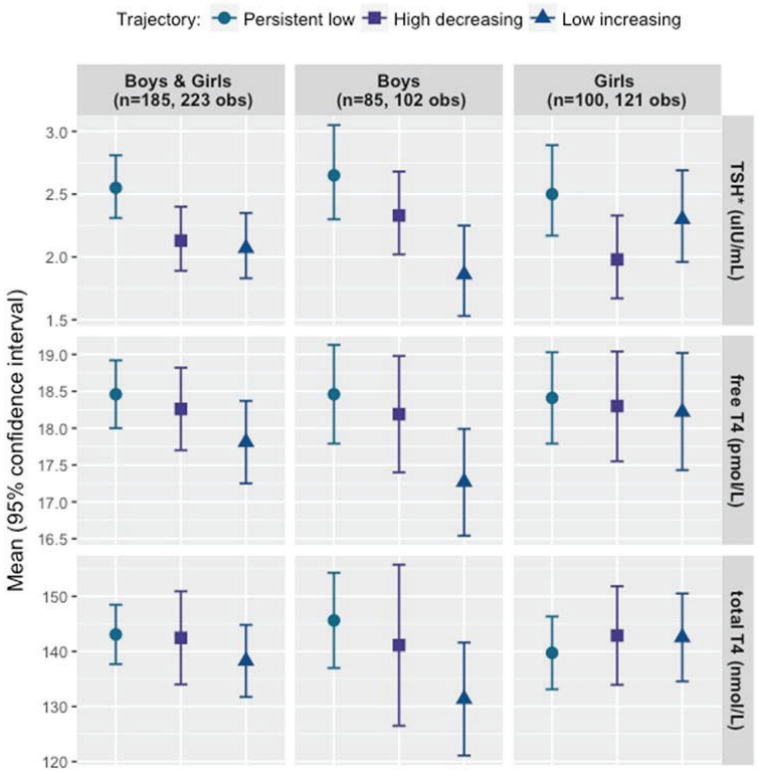

Supplemental Material, **Figure S8**. Sex-specific mean thyroid parameter levels by trajectory of BDE-47 (ng/g lipid). *TSH is geometric mean

Supplemental Material, **Table S9**. Sex-specific associations (β, 95% CI) between BDE-47 trajectories (ng/g lipid) and serum thyroid parameters n=185 children and 223 observations.

	'High decreasing' vs. 'Persistent low'			'Low increasing' vs. 'Persistent low'		
	Boys	Girls	*P-int*	Boys	Girls	*P-int*
Log_{10}TSH (μIU/mL)	-0.06 (-0.15, 0.03)	-0.10 (-0.20, -0.00)	0.54	-0.15 (-0.26, -0.05)	-0.04 (-0.13, 0.05)	0.12
Free T_4 (pmol/L)	-0.27 (-1.32, 0.79)	-0.12 (-1.06, 0.83)	0.78	-1.19 (-2.18, -0.20)	-0.19 (-1.19, 0.82)	0.21
Total T_4 (nmol/L)	-4.50 (-21.69, 12.69)	3.15 (-7.94, 14.23)	0.67	-14.28 (-27.48, -1.07)	2.80 (-7.32, 12.92)	0.06

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Supplemental Material, **Table S10.** Summary of BDE-47 concentration (median) and TSH (GM±GSD), total T_4 (mean±SD) and free T_4 (mean±SD) levels measured in maternal[a], cord, infant or child blood by seven North American birth cohort studies.

Study first author (ref)	N[b]	BDE-47 sample (age, years)	BDE-47 (ng/g lipid)	Thyroid sample (age, years)	TSH (μIU/mL)	total T_4 (μg/dL)	free T_4 (ng/dL)
Chevrier 2010 (1)	270	Maternal blood	15.0	Maternal blood	1.2±1.7	10.7±1.6	0.8±0.2
Stapleton 2011 (2)	136	Maternal blood	18.9	Maternal blood	1.3	6.1[c]	0.7[d]
Vuong 2015 (3)	187	Maternal blood	19.1	Maternal blood	1.2±2.2	10.3±1.9	0.7±0.1
Abdelouahab 2013[c] (4)	380	Maternal blood	21.5	Maternal blood	1.4±0.8	9.1±2.2	1.1±0.1
Abdelouahab 2013[c] (4)	260	Maternal blood	21.5	Maternal blood[e]	2.2±1.2	8.9±1.9	0.8±0.1
Abdelouahab 2013[c] (4)	260	Maternal blood	21.5	Cord blood	9.4±6.2	9.0±1.7	1.0±0.1
Vuong 2015 (3)	256	Maternal blood	19.1	Cord blood	7.1±1.8	9.6±1.8	1.0±0.2
Herbstman 2008 (5)	286	Cord blood	13.8	Cord blood	6.7±1.9	10.5±2.2	1.1±0.2
Herbstman	265	Cord	13.8	Infant	NA	19.0±5.	NA

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2008 (5)		blood		blood		0	
Herbstman 2008 (5)	139	Cord blood	13.8	Infant blood	NA	15.2±3.9	NA
Chevrier 2011 (6)	288	Maternal blood	15.2	Infant blood	5.7±1.8	NA	NA
Jacobson 2016 (7)	80	Child blood (1-5)	36.2	Child blood (1-5)	1.6	9.0	1.0
Vuong 2818 (8)	142	Maternal blood	19.5	Child blood (3)	2.0±1.6	8.8±1.2	0.9±0.1
Vuong 2818 (8)	142	Child blood (2)	58.6	Child blood (3)	2.0±1.6	8.8±1.2	0.9±0.1
Cowell 2018	205	Cord blood	11.8	Child blood (3-5)	2.2±0.1	11.1±2.2	1.4±0.2
Cowell 2018	205	Child blood (2-3)	40.4	Child blood (3-5)	2.2±0.1	11.1±2.2	1.4±0.2

[a]Collected during pregnancy; [b]Sample size refers to the subset of participants included in manuscript analyses; [c]total T_4 converted to ug/dL using nmol/L*0.078; [d]Free T_4 converted to ng/dL using pmol/L*0.078; [e]Measured during delivery

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Supplemental Material References

1. Chevrier J, Harley KG, Bradman A, Gharbi M, Sjodin A, Eskenazi B. Polybrominated diphenyl ether (PBDE) flame retardants and thyroid hormone during pregnancy. *Environ Health Perspect* 2010;**118**(10):1444-9.
2. Stapleton HM, Eagle S, Anthopolos R, Wolkin A, Miranda ML. Associations between polybrominated diphenyl ether (PBDE) flame retardants, phenolic metabolites, and thyroid hormones during pregnancy. *Environ Health Perspect* 2011;**119**(10):1454-9.
3. Vuong AM, Webster GM, Romano ME, Braun JM, Zoeller RT, Hoofnagle AN, Sjodin A, Yolton K, Lanphear BP, Chen A. Maternal Polybrominated Diphenyl Ether (PBDE) Exposure and Thyroid Hormones in Maternal and Cord Sera: The HOME Study, Cincinnati, USA. *Environ Health Perspect* 2015;**123**(10):1079-85.
4. Abdelouahab N, Langlois MF, Lavoie L, Corbin F, Pasquier JC, Takser L. Maternal and cord-blood thyroid hormone levels and exposure to polybrominated diphenyl ethers and polychlorinated biphenyls during early pregnancy. *Am J Epidemiol* 2013;**178**(5):701-13.
5. Herbstman JB, Sjodin A, Apelberg BJ, Witter FR, Halden RU, Patterson DG, Panny SR, Needham LL, Goldman LR. Birth delivery mode modifies the associations between prenatal polychlorinated biphenyl (PCB) and polybrominated diphenyl ether (PBDE) and neonatal thyroid hormone levels. *Environ Health Perspect* 2008;**116**(10):1376-82.
6. Chevrier J, Harley KG, Bradman A, Sjodin A, Eskenazi B. Prenatal exposure to polybrominated diphenyl ether flame retardants and neonatal thyroid-stimulating hormone levels in the CHAMACOS study. *Am J Epidemiol* 2011;**174**(10):1166
7. Jacobson MH, Barr DB, Marcus M, et al. Serum polybrominated diphenyl ether concentrations and thyroid function in young children. *Environmental research.* 2016;149:222-230.
8. Vuong A, Braun JM, Webster GM, Zoeller RT, Hoofnagle, AN, Sjodin A, Yolton K, Lanphear BP, Chen A. Polybrominated diphenyl ether (PBDE) exposures and thyroid hormones in children at age 3 years. *Environment International* 2018: 339-347.