Supplemental Table A. Quality assessment of the studies [a].

Author (Year)	Study design	N	Exposure assessment (method)	Outcome assessment (test)	Potential confounding variables assessed [b]	Adjustment for other pollutants	Good quality study
Cognitive and psychomotor development							
Calderón-Garcidueñas et al. (2012)	Prospective cohort	20	Selected areas below current US standards	WISC-R	Socioeconomic status and body mass index	No	
Clark et al. (2012)	Cross-sectional	960	A combined emission-dispersion and regression modeling approach using the King's College London Emissions Toolkit	Suffolk reading scale Child memory scale "The search and the memory task" SDQ Self-rated health	Maternal education, socioeconomic position (employment status, housing tenure, home crowding), ethnicity, main language spoken at home, parental support for school work, classroom window glazing, long-standing illness,	Aircraft and road traffic noise exposure at school	
Perera, Li et al. (2012)	Birth cohort	100	Adducts in cord blood	WPPSI	Sex, gestational age, maternal age and education, cord lead	Cord lead	Yes
van Kempen et al. (2012)	Cross-sectional	553	LUR model	Neurobehavioral Evaluation System: DMST HECT SAT SDST SRTT	Age, sex, maternal education, employment status, crowding, home ownership, long-standing illness, main language spoken at home, parental support, type of window glazing at school	Road traffic and aircraft noise	
Chiu et al. (2013)	Birth cohort	174	Spatial-temporal LUR model based on children's residence during their lifetime	CPT	Age, sex, child IQ, blood lead level, maternal race and education, pre- and postnatal tobacco smoke exposure, community-level social stress	Blood lead	Yes
Abid et al. (2014)	Cross-sectional	1.257	Urinary PAH metabolites	Parental report (of ever-	Age, sex, race/ethnicity, body mass index, creatinine, socioeconomic status, having a routine source of health	No	

				doctor diagnosed ADHD)	care, birthweight, maternal age at birth, treatment at a newborn care facility, preschool attendance, postnatal environmental tobacco smoke, hours since last meal		
Guxens et al. (2014)	Birth cohort	9.482	LUR models	ASQ BSID I-II-III DDST II MCDI MIDI MSCA	Age, sex, season at birth date, maternal age at delivery, education level, country of birth, smoking during pregnancy, parity and pre-pregnancy body mass index, urbanicity at child's birth address, evaluator and quality of the cognitive test	No	Yes
Kim et al. (2014)	Birth cohort	520	IDW modeling method	K-BSID-II	Sex, birth weight, gestational age, maternal age, maternal education, family income	No	Yes
Lin et al. (2014)	Birth cohort	533	Air-quality monitoring stations in the towns	2 neurobehavioral development parental-reported scales	Gestational age, maternal education, maternal nationality, breastfeeding, parental nursery type, environmental tobacco smoke exposure	No	Yes
Lovasi et al. (2014)	Birth cohort	277	Personal monitoring (2 consecutive days)	WPPSI-R	Sex, ethnicity, maternal education, maternal IQ, environmental tobacco smoke exposure in the home, quality of the caretaking environment, household English language exposure	No	Yes
Tang, Lee et al. (2014)	Birth cohort	308	Adducts in cord blood	GDS	Sex, gestational age, maternal education and age, cord lead, cord mercury, environmental tobacco smoke	Cord lead & mercury	Yes
Tang, Li et al. (2014)	Birth cohort	308	PAH-DNA adducts in cord blood	GDS	Sex, gestational age, maternal education, cord lead level, hours of exposure/day	Yes	Yes

Study	Design	N	Exposure assessment	Cognitive tests	Covariates	Co-exposure	Longitudinal
Calderón-Garciadueñas et al. (2015)	Cross-sectional	50	Subjects residing in high-pollution areas	WISC-R	Age, sex, weight, body mass index	No	
Harris et al. (2015)	Birth cohort	1.109	Spatiotemporal LUR models	KBIT-2, WRAML2 (visual memory index), WRAVMA (visual-motor subtest)	Age, sex, gestational age, birth weight, breastfeeding duration, mothers' IQ and age, parental's education, parity, marital/cohabitation status, race/ethnicity, smoking status, exposure to secondhand smoke during pregnancy, alcohol consumption during pregnancy, annual household income, ownership of a gas stove, neighborhood socioeconomic status, seasonal trends	Blood lead (mother and child)	Yes
Jedrychowski et al. (2015)	Birth cohort	170	DNA adducts in cord blood	WISC-R	Sex, parity, maternal intelligence, maternal education, breastfeeding practice, environmental tobacco smoke during prenatal and postnatal periods, postnatal indoor PAH exposure	No	Yes
Kicinski et al. (2015)	Cross-sectional	606	Distance-weighted traffic density Trans,trans-muconic acid in urine (as a proxy-biomarker of traffic exposure	Neurobehavioral Evaluation System: Continuous performance test, Digit span test, Finger tapping test	Age, sex, maternal education, smoking, passive smoking, socioeconomic status, time of the day, day of the week	Blood lead	
Sunyer et al. (2015)	Prospective cohort	2.715	The average of the two 1-week measures adjusted for temporal variability	ANT N-back task	Age, sex, gestational age and weight, parental education, occupation, marital status, neighborhood socioeconomic status, family origin, breastfeeding, smoking during pregnancy, environmental tobacco smoke at home,	Traffic noise	Yes

					commuting mode, use of computer games, air pollution exposure at home		

Neurobehavior

Perera, Tang et al. (2012)	Birth cohort	253	Personal air monitoring Adducts in cord blood and maternal blood	CBCL	Gestational age, maternal intelligence, maternal education, quality of the proximal caretaking environment, season of monitoring, environmental tobacco smoke exposure during pregnancy, maternal prenatal demoralization, postnatal exposure to PAHs	No	Yes
Becerra et al. (2013)	Case-control	83.229 7.594 cases 75.635 controls	LUR model surfaces	DSM-IV-R	Sex, birth year, gestational age, maternal age, maternal place of birth, race/ethnicity, education, type of birth, parity, insurance type	Yes (inclusion of all pollutants evaluated)	Yes
Jung et al. (2013)	Birth cohort	49.073	IDW modeling method	ICD-9-CM	Sex, gestational age (preterm & full-term), socioeconomic status, comorbidities related to ASD (anxiety, bipolar disorder, depressive disorder, intellectual disabilities, obsessive-compulsive disorder, phobic disorder)	Yes (inclusion of all pollutants evaluated)	Yes
Newman et al. (2013)	Birth cohort	576	LUR methodology	BASC-2	Parents' education, race/ethnicity, duration of breastfeeding, child care attendance during first year of life, smoking during pregnancy, cigarette exposure during 1st year of life, lead exposure at home, cotinine, household income, insurance status	No	Yes
Roberts et al. (2013)	Birth cohort	22.426	U.S. EPA air pollution prediction models	Parental report ADI-R to	Sex, maternal age at birth, maternal parents' education, family income, spouse/partner's education, tract	Yes (inclusion of all pollutants	Yes

				50 randomly selected cases	median income, tract percent college educated, smoking during pregnancy, year of birth, air pollution prediction model year	evaluated)	
Volk et al. (2013)	Case-control	524 279 cases 245 controls	CALINE4 line-source air quality dispersion model	ADI-R ADOS Mullen scales of early learning. Vineland adaptive behavior scales	Sex, child's ethnicity, parents' education, maternal age, smoking during pregnancy, population density	No	Yes
Abid et al. (2014)	Cross-sectional	1.257	Urinary PAH metabolites	Parental report (of ever-doctor diagnosed ADHD)	Age, sex, birthweight, race/ethnicity, maternal age at birth, body mass index, socioeconomic status, having a routine source of health care, treatment at a newborn care facility, preschool attendance, postnatal environmental tobacco smoke, creatinine, hours since last meal	No	
Gong et al. (2014)	Birth cohort	3.426	Dispersion modeling controlling for seasonal variation	A-TAC	Sex, birth weight, gestational age, parity, maternal age at birth, maternal smoking during pregnancy, maternal marital status, parental education, family disposable income during mother's pregnancy, child's first year of life, and the ninth year of life with adjustment for inflation and family size, area-based socioeconomic characteristics in the year of birth, chromosome abnormalities and neurological diseases	No	Yes
Perera et al. (2014)	Birth cohort	250	Adducts in cord blood and maternal blood	CBCL CPRS	Age, sex, child's ethnicity, gestational age, maternal intelligence, maternal	No	Yes

					education, maternal prenatal demoralization, maternal ADHD symptoms, postnatal PAH exposure (urinary PAH metabolites at ages 3& 5), prenatal environmental tobacco smoke exposure, home caretaking environment, heating season, child anxiety/depression at age 9		
Volk et al. (2014)	Case-control	407 251 cases 156 controls	CALINE4 line-source air-quality dispersion model	ADI-R ADOS	Sex, child's ethnicity, maximum education level in the home, maternal age, home ownership and prenatal smoking	No	Yes
von Ehrenstein et al. (2014)	Birth cohort	768	Monthly average exposures during pregnancy	DSM-IV-R	Sex, birth year, maternal age, maternal race/ethnicity, place of birth, education, parity, type of insurance, paternal age and education, pregnancy complications, birth weight, type of birth	No	Yes
Guxens et al. (2015)	Birth/ Prospec-tive cohort	8.079	LUR models	A-TAC CAST CBCL SRS	Age, sex, maternal age, maternal education, country of birth, prenatal smoking, parity, pre-pregnancy body mass index, urbanicity at child's birth address	No	Yes
Kalkbrenner et al. (2015)	Case-control	15.645 979 cases 14.666 controls	Geospatial interpolation method with refined temporal resolution	DSM-IV-R	Sex, gestational age, race/ethnicity, maternal education, maternal age, maternal tobacco use in pregnancy, state, year, season of birth, marital status, residential mobility during gestation, median household income, urbanization	No	Yes
Raz et al.	Nested	1.767	Spatiotemporal models	ADOS	Sex, child's birth year, birth month,	No	Yes

Study	Design	N	Exposure model	Outcome	Confounders[b]		
(2015)	case-control	245 cases 1.522 controls		Maternal report SRS	premature birth, birth weight, paternal age at birth, paternal education, maternal grandparents' education, median census tract income in the birth year, gestational diabetes, preeclampsia, smoking during pregnancy, state, marital status, median census house value		
Talbott et al. (2015)	Case-control	430 211 cases 219 controls	LUR models	ADOS SCQ	Maternal age, maternal education, maternal race, smoking during pregnancy	No	Yes

EPA, Environmental Protection Agency; IDW, Inverse distance weighting; LUR, Land Use Regression.

ADI-R, Autism Diagnostic Interview-Revised; ADOS, Autism Diagnostic Observation Schedules; ANT, Attentional Network Test; ASQ, Ages and Stages Questionnaire; A-TAC, Autism-Tics, ADHD, and other Comorbidities inventory; BASC-2, Behavioral Assessment System for Children, Parent Rating Scale, 2nd Edition; BSID, Bayley Scales of Infant Development (I-first edition, II-second-edition, III-third edition); CBCL, Child Behavior Checklist; CPRS, Conners Parent Rating Scale-Revised; CPT, Conner's Continuous Performance Test; DDST II, Denver Development Screening Test II; DMST, the Digit Memory Span Test; DSM-IV-R, Diagnostic and Statistical Manual of Mental Disorders, 4th Edition, Text Revision; GDS, Gesell Developmental Scale; HECT, the Hand-Eye Coordination Test; ICD-9_CM, International Classification of Diseases, 9th Revision, Clinical Modification; KBIT-2, Kaufman Brief Intelligence Test; K-BSID-II, Korean version of Bayley Scales of Infant Development II; MCDI, McArthur Communicative Development Inventory; MIDI, Minnesota Infant Development Inventory; MRI, Magnetic Resonance Imaging; MRS, Brain magnetic spectroscopy imaging; MSCA, McCarthy Scales of Children's Abilities; SCQ, Social Communication Questionnaire; SDQ, Strengths and Difficulties Questionnaire; SAT, the Switching Attention Test; SDST, the Symbol Digit Substitution Test; SRS, Social Responsiveness Scale; SRTT, the Simple Reaction Time Test; WISC-R, Wechsler Intelligence Scale for Children-Revised; WPPSI-R, Wechsler Preschool and Primary Scale of Intelligence-Revised; WRAML2, Wide Range Assessment of Memory and Learning; WRAVMA, Wide Range Assessment of Visual Motor Abilities.

ADHD, Attention deficit hyperactivity disorder; ASD, Autism spectrum disorder.

CO, Carbon monoxide; NO_2, Nitrogen dioxide; O_3, Ozone; PAHs, Polycyclic aromatic hydrocarbons; PM, Particulate matter; SO_2, Sulfur dioxide.

[a] *Sufficient* - if most of the studies, including good quality studies, report an association, but evidence is not yet conclusive enough to conclude that there is a causal relationship, *limited* - several good quality, independent, studies report an association, but evidence is not yet conclusive enough, *inadequate* - if associations are reported in one or more studies, but insufficient quality, insufficient number of studies, lack of consistency between studies, and/or lack of statistical power preclude a conclusion regarding the presence or absence of an association, *insufficient* - if no associations are reported in one or more studies, but insufficient quality, insufficient number of studies, lack of consistency between studies, and/or lack of statistical power preclude a conclusion regarding the presence or absence of an association, *evidence for lack of association* - several good quality studies are consistent in not showing an association.
[b] These are confounders assessed or that have been considered, but not all of them are finally included in the adjusted models. Some studies included maternal non-smoking status in their eligibility criteria.

Supplemental Table B. Exposure assessment of included studies.

Author (Year)	Exposure Assessment	Pollutant	Levels of exposure
Cognitive and psychomotor development			
Calderón-Garcidueñas et al. (2012)	Selected areas below current US standards	CO, NO, O_3, PM, SO_2, lead:	Levels not provided
Clark et al. (2012)	A combined emission-dispersion and regression modeling approach using the King's College London Emissions Toolkit	NO_2:	Mean (SD): 42,73 (10,60) $\mu g/m^3$
Perera, Li et al. (2012)	Adducts in cord blood	PAH:	Mean (SD): 0,32 (0,14) adducts/10^8 nucleotides
van Kempen et al. (2012)	LUR model	NO_2:	Mean (SD): at home: 30,8 (5,5) $\mu g/m^3$ at school: 31 (5,1) $\mu g/m^3$
Chiu et al. (2013)	Spatial-temporal LUR model based on children's residence during their lifetime	BC:	Mean: 0,63 μg/m3; IQR = 0,53-0,69 μg/m3
Abid et al. (2014)	Urinary PAH metabolites	PAH:	Median: 1-pyrene: 76,1 ng/L 1-napthol: 1290,1 ng/L 2-napthol: 2036.6 ng/L 2-fluorene: 254,3 ng/L 3-fluorene: 102,2 ng/L 1-phenanthrene: 128,7 ng/L 2-phenanthrene: 49,1 ng/L 3-phenanthrene: 106,0 ng/L
Guxens et al. (2014)	LUR models	NO_x: NO_2: $PM_{2.5}$: $PM_{2.5-10}$: PM_{10}:	Range of medians: 40 - 90 μg/m3 11,5 - 43,9 μg/m3 13,4 - 22,3 μg/m3 9 - 20,5 μg/m3 25 - 40,5 μg/m3
Kim et al. (2014)	IDW modeling method	NO_2: PM_{10}:	Mean (range): 26,30 (13,08-45,12) ppb 53,19 (38,84-69,95) $\mu g/m^3$
Lin et al. (2014)	Air-quality monitoring stations in the towns	CO: NO_2: O_3: PM_{10}: SO_2:	Mean (SD): (third trimester of pregnancy) 0,58 (0,13) ppm 18,33 (4,93) ppb 37,45 (10,18) ppb 55,88 (19,58) g/m^3 4,08 (2,51) ppb

		hydrocarbons:	2,59 (0,17) ppm
Lovasi et al. (2014)	Personal monitoring (2 consecutive days) during the 3rd trimester of pregnancy	PAH:	Mean (SD): 3,5 (6,6) ng/m^3
Tang, Lee et al. (2014)	Adducts in cord blood	PAH:	Mean (SD): 0,324 (0,139) adducts/ 10^8 nucleotides (I) 0,204 (0,081) adducts/ 10^8 nucleotides (II)
Tang, Li et al. (2014)	PAH-DNA adducts in cord blood	PAH:	Mean (SD): 0,330 (0,140) adducts/ 10^8 nucleotides (I) 0,200 (0,080) adducts/ 10^8 nucleotides (II)
Calderón-Garciadueñas et al. (2015)	Subjects residing in high-pollution areas	O$_3$: PM$_{2.5}$:	Range: 0,10 - 0,20 ppm 20 - 25 μg/m^3
Harris et al. (2015)	Spatiotemporal LUR models	BC: PM$_{2.5}$:	Mean (SD): (third trimester of pregnancy) 0,69 (0,23) μg/m^3 12,3 (2,6) μg/m^3
Jedrychowski et al. (2015)	DNA adducts in cord blood	PAH:	Mean (95% CI): 0,23 (0,21-0,25) adducts/10^8 nucleotides
Kicinski et al. (2015)	Distance-weighted traffic density Trans,trans-muconic acid in urine (as a proxy-biomarker of traffic exposure	Traffic exposure:	Mean: Residential: 245 km/day School location: 232 km/day 105,3 μg/g
Sunyer et al. (2015)	The average of the two 1-week measures adjusted for temporal variability	EC: NO$_2$: UFP:	Median (min-max): (outdoor values) 1,32 (0,58-3,89) μg/m3 48,5 (25,9-84,5) μg/m3 22.157 (11.939-51.146) no./cm^3

Neurobehavior

Perera, Tang et al. (2012)	Personal air monitoring Adducts in cord blood and maternal blood	PAH:	Mean (SD): 3,23 (2,76) ng/m^3
Becerra et al.	LUR model surfaces	CO:	IQR: 0,55 ppm

(2013)		NO: NO$_2$: O$_3$: PM$_{2.5}$: PM$_{10}$:	29,67 ppb 10,47 ppb 11,54 ppb 4,68 µg/m3 8,25 µg/m3
Jung et al. (2013)	IDW modeling method	CO: NO$_2$: O$_3$: PM$_{10}$: SO$_2$:	(Min-Max) 0,55-0,7 ppm 13-25 ppb 95-120 ppb 35-75 µg/m^3 3-5 ppb
Newman et al. (2013)	LUR methodology	ECAT:	Mean (SD): 0,4 (0,1) µg/m3
Roberts et al. (2013)	U.S. EPA air pollution prediction models	Antimony: Arsenic: Cadmium: Chromium: Diesel particulate: Lead: Manganese: Mercury: Methylene chloride: Nickel: Quinoline: Styrene: Trichloroethylenene: Vinyl chloride:	Mean (SD): 3×10^{-4} (7×10^{-4}) ug/m^3 2×10^{-4} (5×10^{-4}) ug/m^3 2×10^{-4} (5×10^{-4}) ug/m^3 0.001 (0.002) ug/m^3 1,9 (3,0) ug/m^3 0,005 (0,01) ug/m^3 0,004 (0,008) ug/m^3 0,002 (0,001) ug/m^3 0,4 (0,7) ug/m^3 0,005 (0,01) ug/m^3 2×10^{-5} (1×10^{-4}) ug/m^3 0,06 (0,1) ug/m^3 0,3 (0,3) ug/m^3 0.02 (0,06) ug/m^3
Volk et al. (2013)	CALINE4 line-source air quality dispersion model	NO$_2$: O$_3$: PM$_{2.5}$: PM$_{10}$:	Mean (SD): (all pregnancy) 17 (7,1) ppb 36 (8,1) ppb 14,4 (4,4) µg/m3 26 (7,3) µg/m3
Abid et al. (2014)	Urinary PAH metabolites	PAH:	Median: 1-pyrene: 76,1 ng/L 1-napthol: 1290,1 ng/L 2-napthol: 2036.6 ng/L 2-fluorene: 254,3 ng/L 3-fluorene: 102,2 ng/L 1-phenanthrene: 128,7 ng/L 2-phenanthrene: 49,1 ng/L 3-phenanthrene: 106,0 ng/L
Gong et al. (2014)	Dispersion modeling controlling for seasonal variation	NO$_x$: PM$_{10}$:	Median: (log-transformed) 9 µg/m3 (pregnancy) 8 µg/m3 (1st year of life) 4 µg/m3 (9th year of life) 3 µg/m3 (pregnancy) 3 µg/m3 (1st year of life) 2.5 µg/m3 (9th year of life)

Perera et al. (2014)	Adducts in cord blood and maternal blood	PAH:	Mean (SD): (log-transformed) Cord adduct: -1,67 (0,53)/10^8 nucleotides Maternal adduct: -1,73 (0,47) /10^8 nucleotides
Volk et al. (2014)	CALINE4 line-source air-quality dispersion model	NO_2, O_3, $PM_{2.5}$, PM_{10}:	Levels not provided
von Ehreinstein et al. (2014)	Monthly average exposures during pregnancy	24 toxics including aromatic solvents, chlorinated solvents, lead, volatile organics, total PAHs, metals	Range of means (SD): 0.05 (0.01) (Chloroform) – 4.00 (1.30) (Formaldehyde) ppvV 0.19 (0.16) (Hexavalent chromium) – 59.12 (51.69) (Copper) ng/m^3
Guxens et al. (2015)	LUR models	NO_2; NO_x: $PM_{2.5}$: PM_{10}: $PM_{2.5-10}$: $PM_{2.5}$absorbance:	Range of medians: 17,9-42,2 $\mu g/m^3$ 35,25-75,36 $\mu g/m^3$ 8,4-22,4 $\mu g/m^3$ 17,22-41,26 $\mu g/m^3$ 8,93-19,12 $\mu g/m^3$ 1,27-2,55 $\mu g/m^3$
Kalkbrenner et al. (2015)	Geospatial interpolation method with refined temporal resolution	PM_{10}:	Mean (SD): (range from 1994 to 2000) (third trimester of pregnancy) 22,9 (3,1) - 24,5 (3,2) µg/m3
Raz et al. (2015)	Spatiotemporal models	$PM_{2.5}$: $PM_{10-2.5}$:	Mean (SD): 14,6 (3,3) µg/m3 9,9 (4,9) µg/m3
Talbott et al. (2015)	LUR models	$PM_{2.5}$:	Mean (SD): (entire pregnancy) 15.0 (1.9) µg/m3 for cases 14.8 (1.8) µg/m3 for controls

EPA, Environmental Protection Agency; IDW, Inverse distance weighting; LUR, Land Use Regression.

BC, Black carbon; CO, Carbon monoxide; ECAT, Elemental carbon attributed to traffic; PM, Particulate matter; NO, Nitric oxide; NO_x, Nitrogen oxides; NO_2, Nitrogen dioxide; O_3, Ozone; PAHs, Polycyclic aromatic hydrocarbons; SO_2, Sulfur dioxide.