Supplemental Material

Assessing How Social Exposures Are Integrated in Exposome Research: A Scoping Review

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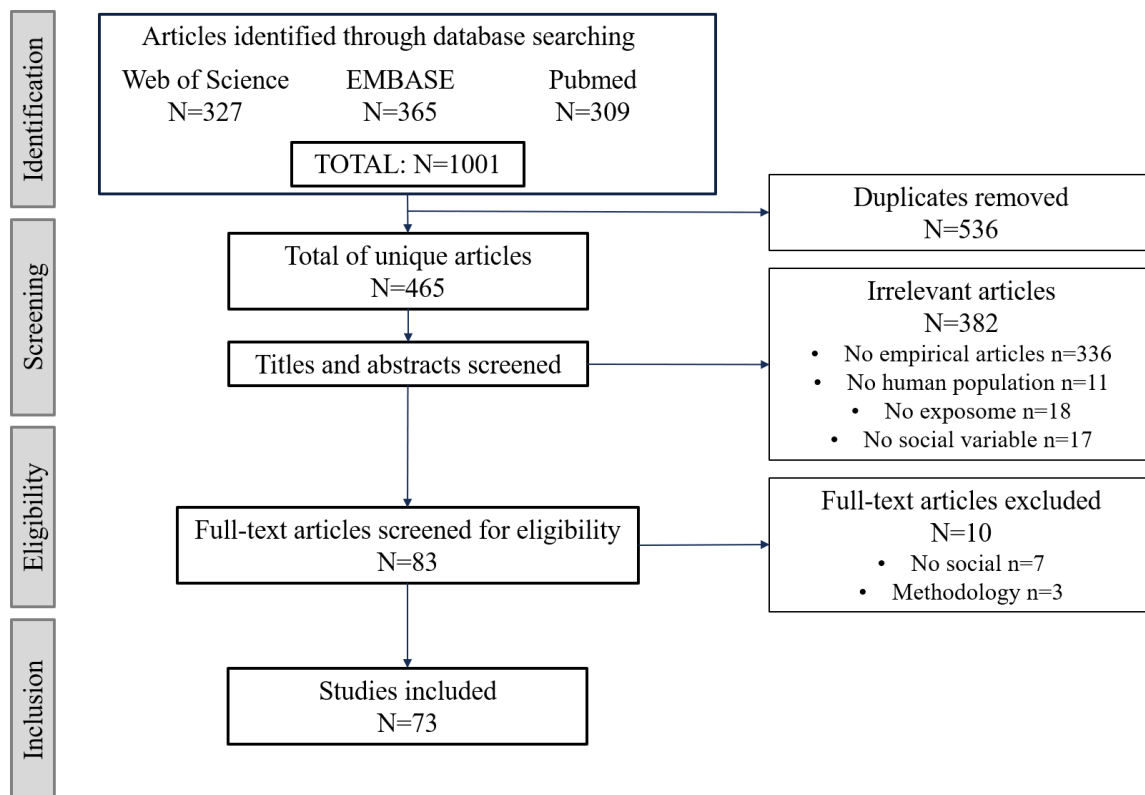## Figure S1: Selection flowchart

Table S1: Characteristics of the 73 selected studies

Authors	Publication year	Journal	Title	Country of origin	Study population	Inclusion period	Sample size	Age range/mean
Agier et al[1]	2019	Lancet Planetary Health	Early-life exposome and lung function in children in Europe: an analysis of data from the longitudinal, population-based HELIX cohort	United Kingdom / France / Spain / Lithuania / Norway / Greece	Mother–child pairs from the HELIX cohort	Depends on the country sub-cohort (from 1999 to 2010)	n=1033	6-12 years old Median age: 8.1 years
Andrianou et al[2]	2019	PeerJ	Application of the urban exposome framework using drinking water and quality of life indicators: a proof-of concept study in Limassol, Cyprus	Cyprus	Residents of the Limassol municipality	2017	n=132	Mean age: 45.6±13.2 years
Barzilay et al[3]	2021	Neurobiology of Stress	Deconstructing the role of the exposome in youth suicidal ideation: Trauma, neighborhood environment, developmental and gender effects	United States	Participants from the Philadelphia Neurodevelopmental Cohort	2009-2011	n=7054	11-21 years old
Bennett et al[4]	2020	International Journal of Environmental Research and Public Health	Characterizing the neurodevelopmental pesticide exposome in a Children's Agricultural Cohort	United States	Households from the agricultural children's cohort located in the Lower Yakima Valley	2005 and 2011	n=200	NA
Bergmann et al[5]	2017	Journal of Exposure Science and Environmental Epidemiology	Multi-class chemical exposure in rural Peru using silicone wristbands	Peru	Participants from 4 communities of the Alto Mayo	2014	n=68	6-73 years old Median age: 39 years

Buekers et al[6]	2018	International Journal of Environmental Research and Public Health	Socio-economic status and health: Evaluation of human biomonitored chemical exposure to per- and polyfluorinated substances across status	Meta-analysis	Published peer-reviewed studies	Up to January 2018	n=5	NA
Calamandrei et al[7]	2020	Environmental Research	Pregnancy exposome and child psychomotor development in three European birth cohorts	Croatia / Slovenia / Poland	Children from the Public Health Impact of long-term, low-level, Mixed element Exposure in susceptible population strata (PHIME) and Polish mother and child cohort study (REPRO_PL) – HEALS project	Pregnant women recruited between 2006-2011	n=984	0-2 years old
Choi et al[8]	2020	American Journal of Psychiatry	An exposure-wide and mendelian randomization approach to identifying modifiable factors for the prevention of depression	United Kingdom	Adults of white British ancestry enrolled in the UK Biobank	follow-up 6 to 8 years after initial enrolment	n=115,000	Mean age: 56±7.7 years old
Chung et al[9]	2018	Environmental Science and Technology	Toward capturing the exposome: exposure biomarker variability and coexposure patterns in the shared environment	United States	Couples from Longitudinal Investigation of Fertility and the Environment (LIFE) Study	2005−2009	n=501 (1002 individuals)	Females: 30±4 years old Males: 31.8±4.9 years old
Cifuentes et al[10]	2019	Journal of Urban Health	Application of the public health exposome framework to estimate phenotypes of resilience in a model Ohio African-American women's cohort	United States	[area-level] Counties in Ohio	Depends on the source database	n=88 (9232 census-blocks)	NA

Colicino et al[11]	2021	Environment International	Non-linear and non-additive associations between the pregnancy metabolome and birthweight	United States	Mother-child dyads enrolled in the Programming of Intergenerational Stress Mechanisms (PRISM) cohort	Pregnant mothers recruited from 2011	n=410	New-borns
Colicino et al[12]	2020	Environmental Research	Association between prenatal immune phenotyping and cord blood leukocyte telomere length in the PRISM pregnancy cohort	United States	Mother-child dyads enrolled in the PRogramming of Intergenerational Stress Mechanisms (PRISM) pregnancy cohort	Pregnant women included in 2011	n=129	New-borns
de Prado-Bert et al[13]	2021	Environment International	The early-life exposome and epigenetic age acceleration in children	United Kingdom / France / Spain / Lithuania / Norway / Greece	Children from the HELIX study	Depends on the country sub-cohort (from 1999 to 2010)	n=1173	6-11 years old Mean age (at blood collection) 7± 2 years
Doherty et al[14]	2020	Frontiers in Public Health	Assessment of multipollutant exposures during pregnancy using silicone wristbands	Unites States	Women from the New Hampshire Birth Cohort Study	between March 2017 and December 2018	n=255	18-45 years old Median age: 31 years
Dreno et al[15]	2019	Journal of the European Academy of Dermatology and Venereology	The role of exposome in acne: results from an international patient survey	France / Germany / Italy / Brazil / Canada / Russia	Young adults surveyed via Internet	2018-2019	n=6,679	15-39 years old
Erzin et al[16]	2021	Psychological Medicine	Association between exposome score for schizophrenia and functioning in first-episode psychosis: results from the Athens first-episode psychosis research study	Greece	Individuals with first-episode psychosis from the Athens FEP Research Study	Between March 2015 - March 2020	n=225	16-45 years
Eyles et al[17]	2019	Social Science & Medicine	Occupied with classification: Which occupational classification scheme better predicts health outcomes?	All EU countries and European Economic Area (EEA) countries	Participants to the European Working Conditions Survey (EWCS)	Years 2010 and 2015	n=81,115	
Ferrreira et al[18]	2019	Chemosphere	Home-based and informal work exposes the families to high levels of potentially toxic elements	Brazil	Participants with at least one outsourced worker who produced jewellery inside of the house	2017	n=165	All age groups

Author	Year	Journal	Title	Country	Population	Period	n	Age
Fishe et al[19]	2022	Science of the Total Environment	Environmental effects on acute exacerbations of respiratory diseases: A real-world big data study	United States	Patients from the OneFlorida database	2012-2017	n=533,446	All age groups (<18 to >80 years)
Gagliardi et al[20]	2020	Cancer Epidemiology Biomarkers and Prevention	Stochastic epigenetic mutations are associated with risk of breast cancer, lung cancer, and mature b-cell neoplasms	Italy / Australia / Norway	Case–control pairs nested in three prospective cohorts (EPIC Italy / MCCS Melbourne / Norwegian NOWAC)	EPIC 1992-99 MCCS 1990-94 NOWAC 2003-06	n=4497	Mean age: EPIC 54±7 years MCCS 59±8 years NOWAC 56±4 years
Georgopoulos et al[21]	2014	Risk Analysis	A tiered framework for risk-relevant characterization and ranking of chemical exposures: applications to the National Children's Study (NCS)	United States	[area-level] Contiguous US counties	Various	Various, up to 3109	NA
Gittner et al[22]	2017	Obesity Research & Clinical Practice	A multifactorial obesity model developed from nationwide public health exposome data and modern computational analyses	United States	[area-level] Counties of greater than 100,000 persons	2009	n=3106	NA
Golding et al[23]	2018	Wellcome Open Research	Are the early childhood antecedents of men's external locus of control similar to those of their female partners?	United Kingdom	Men from the Avon Longitudinal Study of Parents and Children (ALSPAC)	expecting a child between 1st April 1991 and 31st December 1992	n=8645	15-65 years old Mean age: 30.6±5.7 years
Golding et al[24]	2017	Wellcome Open Research	The mid-childhood and adolescent antecedents of women's external locus of control orientation	United Kingdom	Pregnant women from the Avon Longitudinal Study of Parents and Children (ALSPAC)	expected date of delivery between April 1991 and December 1992	n=12,638	
Granum et al[25]	2020	Environment International	Multiple environmental exposures in early-life and allergy-related outcomes in childhood	United Kingdom / France / Spain / Lithuania / Norway / Greece	Mother–child pairs from the HELIX (Human Early-Life Exposome) study	Pregnant women recruited 1999-2010 (depends on the country sub-cohort); follow-up 2013-2016	n=1270	6-11 years old

Guillien et al[26]	2020	Environmental Research	Profile of exposures and lung function in adults with asthma: An exposome approach in the EGEA study	France	Adults of the Epidemiological study on the Genetics and Environment of Asthma, bronchial hyperresponsiveness and atopy (EGEA)	2003-2007	n=599	16-79 years old Mean age: 39±16 years
Guo et al[27]	2021	Environment International	Exploring personal chemical exposures in China with wearable air pollutant monitors: A repeated-measure study in healthy older adults in Jinan, China	China	Older adults in Jinan, China, as part of the Biomarkers for Air Pollutants Exposure (China BAPE) study	From September 2018 to January 2019	n=84	60-69 years
Hu et al[28]	2020	Environment International	An external exposome-wide association study of hypertensive disorders of pregnancy	United States	Women with registered live births in Florida	Conception date during 2010-2013	n=819,399	Median age between 25-29 years old
Huang et al[29]	2021	BMC Medicine	Investigating causal relationships between exposome and human longevity: a Mendelian randomization analysis	United Kingdom	Individuals from the UK Biobank	Individuals recruited between 2006-2010	n=361,194	90+ group: mean age 97 [87-122] years 99+ group: mean age 101 [90-122] years Control group: mean 55 [0-88] years
Juarez et al[30]	2017	Environmental Disease	A novel approach to analyzing lung cancer mortality disparities: Using the exposome and a graph-theoretical toolchain	United States	[area-level] Counties	1999-2013	n=2067	NA
Julvez et al[31]	2021	Environmental Pollution	Early life multiple exposures and child cognitive function: A multi-centric birth cohort study in six European countries	United Kingdom / France / Spain / Lithuania / Norway / Greece	Mother-child pairs from the HELIX study	Depends on the country sub-cohort (from 1999 to 2010)	n=1298	6–11 years-old

Kershenbaum et al[32]	2014	International Journal of Environmental Research and Public Health	Exploration of preterm birth rates using the public health exposome database and computational analysis methods	United States	[area-level] Counties of greater than 100,000 persons	2003-2011	n=520	*NA*
Labib et al[33]	2021	Science of the Total Environment	Estimating multiple greenspace exposure types and their associations with neighbourhood premature mortality: A socioecological study	United Kingdom	[area-level] English Lower Super Output Area (LSOA) Census units	Mortality data for the period 2008 to 2012	n=1673	*NA*
Lau et al[34]	2018	BMC Medicine	Determinants of the urinary and serum metabolome in children from six European populations	United Kingdom / France / Spain / Lithuania / Norway / Greece	Children recruited from the European HELIX cohort	Depends on the country sub-cohort (from 1999 to 2010)	n=1192	6-11 years old
Lee et al[35]	2017	Environment International	Identification of chemical mixtures to which Canadian pregnant women are exposed: The MIREC Study	Canada	Women from the Maternal-Infant Research on Environment Chemicals (MIREC) Study	2008-2011	n=1744	18-48 years old median: 32 years
Levin-Schwartz et al[36]	2019	Environmental Health	Time-varying associations between prenatal metal mixtures and rapid visual processing in children	Mexico	Mother-child pairs enrolled in the Programming Research in Obesity, Growth Environment and Social Stress (PROGRESS) birth cohort study	2007-2011	n=393	6-9 years old
Li et al[37]	2019	Environmental Research	Lifelong exposure to multiple stressors through different environmental pathways for European populations	Italy	Individuals previously enrolled in the ITR (Italian Twin Registry)	2001	n=1510	Up to 75 years old
Maitre et al[38]	2014	BMC Medicine	Urinary metabolic profiles in early pregnancy are associated with preterm birth and fetal growth restriction in the Rhea mother–child cohort study	Greece	Mother-child pairs from the Rhea cohort	2007	n=464	New-borns

Author	Year	Journal	Title	Country	Population	Period	n	Age
Maitre et al[39]	2021	Environment International	Early-life environmental exposure determinants of child behavior in Europe: A longitudinal, population-based study	United Kingdom / France / Spain / Lithuania / Norway / Greece	Children from the HELIX study	Depends on the country sub-cohort; follow-up between 12/2013 and 02/2016	n=1287	6.5-11 years old Mean age: 8 years
Maitre et al[40]	2018	Environmental Science and Technology	Urine metabolic signatures of multiple environmental pollutants in pregnant women - an exposome approach	Spain	Women from the Sabadell subcohort & Gipuzkoa subcohort from INMA (INfancia y Medio Ambiente) birth cohort	2004-2008	n=750	Median age: 30-31 years
Martins et al[41]	2021	Neurobiology of Stress	Childhood adversity correlates with stable changes in DNA methylation trajectories in children and converges with epigenetic signatures of prenatal stress	Germany	Children from the Berlin Longitudinal Child Study		n=173	3–5 years old
Mueller et al[42]	2020	Environmental Research	Urban greenspace and the indoor environment: Pathways to health via indoor particulate matter, noise, and road noise annoyance	United Kingdom / Netherlands / Greece	Households – HEALS project	March 2015 – June 2016	n=131	NA
Nielsen et al[43]	2020	Environmental Research	Space-time hot spots of critically ill small for gestational age newborns and industrial air pollutants in major metropolitan areas of Canada	Canada	Infants from neonatal admission data from the Canadian Neonatal Network	2006-2010	n=32,836	New-borns
Nielsen et al[44]	2019 (a)	Science of the Total Environment	Geographic information assessment of maternal ambient health hazards and adverse birth outcomes in Canada	Canada	Newborns from the Canadian Vital Statistics registered births file	2006-2012	n=2,525,645	New-borns
Nielsen et al[45]	2019 (b)	Environmental Health Insights	Spatiotemporal patterns of small for gestational age and low birth weight births and associations with land use and socioeconomic status	Canada	Neonates from Calgary and Edmonton Census Metropolitan Areas (Alberta)	2006-2010	n=121,259 Alberta Perinatal Health Program / n=4150 Canadian	NA

							Neonatal Network	
Nieuwenhuijsen et al[46]	2019	Environmental Health Perspectives	Influence of the urban exposome on birth weight	United Kingdom / France / Spain / Lithuania / Norway / Greece	Singleton pregnancies from the European HELIX cohort	Depends on the country sub-cohort (from 1999 to 2010)	n=31,458	New-borns
North et al[47]	2017	Annals of Allergy, Asthma and Immunology	The Kingston Allergy Birth Cohort - Exploring parentally reported respiratory outcomes through the lens of the exposome	Canada	Children from the Kingston Allergy Birth Cohort (KABC)		n=560 prenatal n=235 postnatal	2 years old
Nowicki et al[48]	2018	Frontiers in Psychology	Early home-life antecedents of children's locus of control	United Kingdom	Children from the Avon Longitudinal Study of Parents and Children (ALSPAC)	Pregnant mother recruited between 1990-92	n=6381	8 years old
Nwanaji-Enwerem et al[49]	2021	Aging (Albany NY)	Maternal adverse childhood experiences before pregnancy are associated with epigenetic aging changes in their children	United States	Children from the California, Salinas Valley CHAMACOS study	Pregnant mothers recruited between October 1999 – October 2000	n=238	7, 9, 14 years old
Ohanyan et al[50]	2022	Environment International	Machine learning approaches to characterize the obesogenic urban exposome	Netherlands	Participants of the Occupational and Environmental Health Cohort study (AMIGO)	2011-2012	n=14,829	31-65 years Mean age: 50.7 ± 9.4 years
Ourshalimian et al[51]	2019	Environmental Research	Arsenic and fasting blood glucose in the context of other drinking water chemicals: a cross-sectional study in Bangladesh	Bangladesh	Adults participating in the Bangladesh Demographic and Health Survey (BDHS)	2011	n=6587	≥ 35 years old Mean age: 53 years
Oyana et al[52]	2015	International Journal of Environmental Research and Public Health	Using an External Exposome Framework to Examine Pregnancy-Related Morbidities and Mortalities: Implications for Health Disparities Research	United States	[area-level] Counties in the 48 contiguous USA	2010-2014	n=3109	NA

Patel et al[53]	2017	International Journal of Epidemiology	Systematic correlation of environmental exposure and physiological and self-reported behaviour factors with leukocyte telomere length	United States	Participants from the National Health and Nutrition Examination Survey (NHANES) study	waves 1999-2000 and 2001-02	n=7118	Mean age: 52±20 years old
Pino et al[54]	2017	Environmental Research	Human biomonitoring data analysis for metals in an Italian adolescents cohort: An exposome approach	Italy	Adolescents from the PROgramme for Biomonitoring general population Exposure (PROBE) study	2008-2009	n=453	13-15 years old
Robinson et al[55]	2018	Environmental Health Perspectives	The urban exposome during pregnancy and its socioeconomic determinants	United Kingdom / France / Spain / Lithuania / Norway / Greece	Mothers of singletons born between 1999 and 2010 from the HELIX study	Depends on the country sub-cohort (from 1999 to 2010)	n=28,045	Mean age ranges from 27.8 to 32.6 years old according to the sub-cohorts
Saberi Hosnijeh et al[56]	2020	Cancer Epidemiology	Association between anthropometry and lifestyle factors and risk of B-cell lymphoma: An exposome-wide analysis	Denmark / France / Germany / Greece / Netherlands / Italy / Norway / United Kingdom / Spain / Sweden	Adults from the European Prospective Investigation into Nutrition and Cancer (EPIC) cohort	1992-2000	n=475,426	30-70 years old
Salles et al[57]	2021	Science of the Total Environment	Home-based informal jewelry production increases exposure of working families to cadmium	Brazil	Participants living in Limeira, São Paulo state, Brazil	2017	n=192	All age groups
Sarigiannis et al[58]	2018	Epidemiologia e Prevenzione	Addressing complexity of health impact assessment in industrially contaminated sites via the exposome paradigm	Greece	Children from the HERACLES (Waste Management) Greek cohort	2012	n=350	3-8 years old
Sarigiannis et al[59]	2021	Environmental Research	Neurodevelopmental exposome: The effect of in utero co-exposure to heavy metals and phthalates on child neurodevelopment	Poland	Children from the Polish Mother and Child Cohort	Pregnant mothers included in 2007	n=148	1 & 2 years old

Sehgal et al[60]	2021	International Journal of Environmental Research and Public Health	Neighborhood Exposures and Blood Pressure Outcomes: A Cross-Sectional Environmental Study among 19-53 Years-Old Parsis in Mumbai.	India	Adults from four Parsi neighbourhoods	2017	n=1530	19-53 years
Shaw et al[61]	2018	Epidemiology	Residential agricultural pesticide exposures and risks of spontaneous preterm birth	United States	New-borns from Fresno, Kern, Kings, Madera, Merced, San Joaquin, Stanislaus, and Tulare counties	1998-2011	n=197,461 term control births and n=27,913 preterm case births	New-borns
Steer et al[62]	2015	PLOS One	Preconception and prenatal environmental factors associated with communication impairments in 9-year old children using an exposome-wide approach	United Kingdom	Children from the Avon Longitudinal Study of Parents and Children (ALSPAC) study	born between 1st April 1991 and 31st December 1992	n=7613	9 years old
Stratakis et al[63]	2020	JAMA Network Open	Association of fish consumption and mercury exposure during pregnancy with metabolic health and inflammatory biomarkers in children	United Kingdom / France / Spain / Lithuania / Norway / Greece	Mothers and their singleton child from the HELIX study	2003-2009 (follow-up 2013-2016)	n=805	6-12 years old Mean age: 8.4±1.5 years
Travis et al[64]	2020	Science of the Total Environment	Catching flame retardants and pesticides in silicone wristbands: Evidence of exposure to current and legacy pollutants in Uruguayan children	Uruguay	Participants of the Scola-Exposome study	2018	n=24	6-7.8 years old
Vrijheid et al[65]	2020	Environmental Health Perspectives	Early-life environmental exposures and childhood obesity: An exposome-wide approach	United Kingdom / France / Spain / Lithuania / Norway / Greece	Mother-child pairs from the HELIX study	Depends on the country sub-cohort; follow-up 2013-2016	n=1,301	6-11 years old
Wan et al[66]	2021	Journal of Exposure Science & Environmental Epidemiology	Indoor exposure to phthalates and polycyclic aromatic hydrocarbons (PAHs) to Canadian children: the Kingston allergy birth cohort.	Canada	Children from The Kingston Allergy Birth Cohort	Dust sampling from June 24, 2014 to February 25, 2015	n=79	18 months to 14 years old

Warembourg et al[67]	2019	Journal of the American College of Cardiology	Early-life environmental exposures and blood pressure in children	United Kingdom / France / Spain / Lithuania / Norway / Greece	Children from the European HELIX cohort	Depends on the country sub-cohort; follow-up 2014-2015	n=1,277	6.5-11 years old Mean 8 years
Wheeler et al[68]	2021	International Journal of Environmental Research and Public Health	Assessment of grouped weighted quantile sum regression for modeling chemical mixtures and cancer risk	United States	Participants to the California Childhood Leukemia Study	1995-2012	n=564	<8 years old at diagnosis
Yan et al[69]	2019	Environment International	Maternal serum metabolome and traffic-related air pollution exposure in pregnancy	United States	Women with registered live births in California Central Valley region	Children born between 2005 and 2010	n=160	Median age: 25 years old
Yan et al[70]	2021	Chemical Research in Toxicology	High-resolution metabolomic assessment of pesticide exposure in Central Valley, California	United States	Older adults living in the California Central Valley	2001-2007	n=176	35-92 years old Mean age: 66.1±13.4 years
Yang et al[71]	2015	Human Reproduction	Association of serum levels of typical organic pollutants with polycystic ovary syndrome (PCOS): a case–control study	China	Han women from Northern China	2012	n=80	Mean age: 30±3 years
Yitshak-Sade et al[72]	2020	International Journal of Environmental Research and Public Health	Estimating the combined effects of natural and built environmental exposures on birthweight among urban residents in Massachusetts	United States	Singleton live births in Massachusetts	2001-2011	n = 150,665	New-borns
Young et al[73]	2021	Environment International	Chemical contaminant exposures assessed using silicone wristbands among occupants in office buildings in the USA, UK, China, and India	United States / United Kingdom / China / India	Workers of the pre-existing Global CogFx Study cohort	2019	n=251	18-65 years

Table S2: Use of social variables

Exposure	Confounder	Exposure + Confounder	Descriptive	Effect-modifier	Exposure + Effect-modifier	Confounder + Effect-modifier	Exposure / confounder + descriptive
N=22	**N=15**	**N=18**	**N=5**	**N=2**	**N=1**	**N=2**	**N=8**
Bergmann et al [5]	Bennett et al [4]	Agier et al [1]	Chung et al [9]	Fishe et al [19]	Barzilay et al [3]	Labib et al [33]	Andrianou et al [2]
Buekers et al [6]	Colicino et al 2020 [12]	Calamendrei et al [7]	Ferrreira et al [18]	Li et al [37]		Stratakis et al [63]	Cifuentes et al [10]
Doherty et al [14]	Colicino et al 2021 [11]	Choi et al [8]	Maitre et al 2018 [40]				Golding et al 2018 [23]
Dreno et al [15]	Gagliardi et al [20]	De Prado-Bert [13]	Travis et al [64]				Guillien et al [26]
Eyles et al [17]	Lau et al [34]	Erzin et al [16]	Young et al [73]				Maitre et al 2014 [38]
Georgopoulos et al [21]	Levin-Schwartz et al [36]	Granum et al [25]					Maitre et al 2021 [39]
Gittner et al [22]	Mueller et al [42]	Hu et al [28]					Salles et al [57]
Golding et al 2017 [24]	Nielsen et al 2020 [43]	Juarez et al [30]					Yan et al 2019 [69]
Guo et al [27]	Nielsen et al 2019 (a) [44]	Julvez et al [31]					
Huang et al [29]	Nieuwenhuijsen et al [46]	Nwanaji-Enwerem et al [49]					
Kershenbaum et al [32]	Ourshalimian et al [51]	Ohanyan et al [50]					
Lee et al [35]	Wan et al [66]	Patel et al [53]					
Martins et al [41]	Wheeler et al [68]	Robinson et al [55]					
Nielsen et al 2019 (b) [45]	Yan et al 2021 [70]	Sehgal et al [60]					
North et al [47]	Yang et al [71]	Shaw et al [61]					
Nowicki et al [48]		Vrijheid et al [65]					
Oyana et al [52]		Warembourg et al [67]					
Pino et al [54]		Yitshak-Sade et al [72]					
Saberi Hosnijeh et al [56]							
Sarigiannis et al 2018 [58]							
Sarigiannis et al 2021 [59]							
Steer et al [62]							

Table S3: Nature, frequency and use of the social variables

	Frequency	Exposure	Confounder[*]	Effect-modifier[**]	Description	Confounder + effect-modifier	Exposure + effect-modifier	Exposure + confounder
INDIVIDUAL CHARACTERISTICS – 36.8%	N=105							
Education	24	8	10	1	5			
Race / ethnicity	19	3	12	1	3			
Occupation / social class	9	3	3		3			
Childhood adversity	7	6	1					
Psychosocial factors (stress, social support, contact, engagement)	6	5	1					
Rural / Urban	6	2	4					
Country of birth	5	1	2		2			
Income	4	2			2			
Employment status	4		2		2			
Government support	3	1	2					
Housing	3	2	1					

	Total				
Wealth (material)	2	1			1
Working conditions	2			2	
Paid child care	2	2			
Traumatic life experiences (lifecourse)	2	1	1		
Migration status	1		1		
Individual socioeconomic status	1	1			
Poverty	1		1		
Food security	1		1		
Financial constraint in access to care	1	1			
Perception of neighbourhood security	1	1			
Verbal discrimination	1	1			
AREA-LEVEL CHARACTERISTICS – 28.1%	N=80				
Financial difficulties (food (in)security, government support, poverty, health insurance)	16	13	1	2	
Neighbourhood socioeconomic status (deprivation & economic segregation)	12	6	3	2	1

Category					
Race / ethnicity	9	8			1
Income	8	7	1		
Violence / safety (crime rate, homicide rate, injury deaths, robbery)	7	6	1		
Education	5	5			
Social (social capital, social support, single parent household, linguistic isolation)	5	5			
Housing difficulties / accessibility	4	3	1		
Employment	3	2		1	
Segregation (spatial proximity)	2	2			
Rural / Urban	2	2			
Access to facilities (medical, educational, recreational)	1	1			
Literacy	1	1			
Vulnerable populations	1	1			
Wealth	1	1			

House crowding	1	1				
Occupation	1	1				
Maternal education	1	1				
PARENTAL CHARACTERISTICS – 20.7%	N=59					
Education	31	9	17	3	1	1
Race / ethnicity	7	4	3			
Parental country of birth	6		6			
Occupation	4	4				
Maternal stress	3	1	2			
Employment	2	2				
Parental adverse life events	2	2				
Parental socioeconomic status	1	1				
Maternal migration	1		1			
Maternal social class	1	1				
Maternal health insurance	1		1			

FAMILY / HOUSEHOLD CHARACTERISTICS – 14.4%	N=41							
Material conditions (Family affluence score, income, wealth, financial hardship)	14	9	4					1
Social network (Family contact with family-friends, social participation, social network)	14	14						
Living conditions (House crowding, family structure, number of inhabitants)	9	7	1		1			
Socioeconomic status (Family / household)	3	2	1					
Family adversity index	1	1						
N total	**285**	**164**	**85**	**4**	**27**	**1**	**1**	**3**
%		**57.5%**	**29.8%**	**1.4%**	**9.5%**	**0.4%**	**0.4%**	**1.1%**

* A confounder causes both the exposure and outcome of interest.

** An effect-modifier modulates the effect of an exposure on the outcome according to the level of this variable.

This table was used to build the word cloud (Figure 2).

Table S4: Social hypotheses and mechanisms

Agnostic approach		Hypothesis-driven approach				Mixed approaches
		Social hypothesis in intro = YES		Social hypothesis in intro = NO		
Classical	Mentioning social features	Social mechanism in discussion	No social mechanism in discussion	Social mechanism in discussion	No social mechanism in discussion	
N=20	**N=16**	**N=7**	**N=5**	**N=1**	**N=22**	**N=2**
Andrianou et al [2]	Agier et al [1]	Barzilay et al [3]	Colicino et al 2020 [12]	Yitshak-Sade et al [72]	Bennett et al [4]	Georgopoulos et al [21]
Cal amandrei et al [7]	Choi et al [8]	Bergmann et al [5]	Erzin et al [16]		Chung et al [9]	Juarez et al [30]
Colicino et al 2021 [11]	Cifuentes et al [10]	Buekers et al [6]	Fishe et al [19]		Doherty et al [14]	
De Prado-Bert et al [13]	Gittner et al 2017 [22]	Eyles et al [17]	Labib et al [33]		Dreno et al [15]	
Granum et al [25]	Golding et al 2018 [23]	Martins et al [41]	Nielsen et al 2019 (b) [45]		Ferrreira et al [18]	
Guillien et al [26]	Golding et al 2017 [24]	Nwanaji-Enwerem et al [49]			Gagliardi et al [20]	
Guo et al [27]	Julvez et al [31]	Sehgal et al [60]			Lau et al [34]	
Hu et al [28]	Kershenbaum et al [32]				Lee et al [35]	
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Nieuwenhuijsen et al [46]	Oyana et al [52]				Maitre et al 2018 [40]	
North et al [47]	Robinson et al [55]				Mueller et al [42]	
Nowicki et al [48]	Saberi Hosnijeh et al [56]				Nielsen et al 2020 [43]	
Patel et al [53]	Sarigiannis et al 2018 [58]				Nielsen et al 2019 (a) [44]	
Pino et al [54]	Steer et al [62]				Ourshalimian et al [51]	
Sarigiannis et al 2021 [59]	Warembourg et al [67]				Sal les et al [57]	
Vrijheid et al [65]					Shaw et al [61]	
Wheeler et al [68]					Stratakis et al [63]	
Yan et al 2021 [70]					Travis et al [64]	
Young et al [73]					Wan et al [66]	
					Yan et al 2019 [69]	
					Yang et al [71]	

This table was used to build the Figure 2.

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