|  |
| --- |
| Table S1. Summary of literature on maternal psychological distress and fetal outcomes.  |
|  | **Country** | **Study Design** | **Sample size** | **Age of children****(years)** | **Maternal exposures and assessment during pregnancy** | **Fetal outcomes \*** | **Direction of the observed associations** |
| Diego et al. 2009 | USA | Case-control  | 80 | Fetal period Birth | Diagnosis of depression (SCID-D and CES-D) | Fetal growthPrematurityBirth weight | Fetal growth$ $Risk of prematurity Birth weight  |
| Ding et al. 2014 | - | Meta-analysis  | 12 studies included(total N > 17,000) | Birth outcomes | Different measures of anxiety # | PrematurityBirth weight | Risk of prematurity Birth weight  |
| Grote et al. 2009 | - | Meta-analysis | 29 studies included(total N > 40,000) | Birth outcomes | Different measures of depression ## | Fetal growthPrematurityBirth weight | Fetal growth$ -$Risk of prematurity Birth weight  |
| Henrichs et al 2010 | The Netherlands | Population-based prospective  | 6,313 | Fetal period | Psychological distress, depression, anxiety (BSI)Family stress (FAD) | Fetal growthFetal head and abdominal growthBirth weight | Only anxiety: fetal growth Only anxiety: birth weight Fetal weight gain Fetal head and abdominal growth  |
| Hompes et al. 2012 | Belgium | Prospective  | 91 | Fetal period Birth | Anxiety (HADS and PRAQ), depression (EDS and HADS) | Fetal growthBirth weightPI | Fetal growth Birth weight $-$BMI and PI at birth  |
| Maina et al.2008 | Italy | Case-control  | 80 | Fetal period Birth | Psychiatric disorder (MINI-Plus), stressful life events, depression and anxiety (HRS) | Fetal growthBirth weightPrematurity | Fetal growth$ -$Risk of prematurity $-$Birth weight  |
| El Marroun et al. 2012 | The Netherlands | Population-based prospective | 7,696 | Fetal period | Depression (BSI) | Fetal body growthFetal head growthPrematurity | Fetal body growth Fetal head growth Risk of prematurity $-$ |
| Lewis et al. 2016 | - | Systematic review | 9 studies included(total N > 7,000) | Fetal period | Different measures of depression, anxiety and stress  | Different measurements of fetal growth | Fetal growth  |
| Uguz et al.2011 | Turkey | Case-control  | 148 | Fetal period | Diagnosis ### and level of depression and anxiety(BDI and BAI) | Fetal growth | Fetal growth  |
| Wisner et al. 2009 | USA | Prospective | 238 | Fetal periodBirth | Diagnosis of depression (SCID) | PrematurityBirth weight | Risk of prematurity Birth weight$ -$ |
|  |
| \*= Outcomes were measured by fetal ultrasonography or were obtained from clinical records. |
| = positive direction of the observed association= negative direction of the observed association $-$ = no association observed |
| **Abbreviations:** BAI = Beck Anxiety Inventory, BDI = Beck Depression Inventory, BSI = Brief Symptom Inventory, CES-D = The Centre for Epidemiological Studies-Depression scale, EDS = Edinburgh Depression Scale, FAD = Family Assessment Device, HADS = Hospitality Anxiety and Depression Scale, HRS = Hamilton Rating Score for Depression and Anxiety, MINI-Plus = Mini International Neuropsychiatric Interview Plus , PI = Ponderal Index, PRAQ = Pregnancy-Related Anxiety Questionnaire, SCID-D = Structured Clinical Interview for DSM-IV Axis I Disorders, # = Anxiety symptoms or anxiety disorder assessed in all pregnant women by means of self-reported questionnaire or structures psychiatric interview, ## = consistent with the Diagnostic and Statistical Manual of Mental Disorders (Third Edition) or later criteria, ### =  The Structured Clinical Interview for the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition.  |

|  |
| --- |
| Table S2. Summary of literature on maternal psychological distress and child cardiometabolic outcomes. |
|  | **Country** | **Study Design** | **Sample size** | **Age of children****(years)** | **Maternal exposures and assessment during pregnancy** | **Child outcomes \*** | **Direction of the observed associations** |
| Allister et al.  | USA | Case control  | 20 | Fetal period | Depression (BDI)  | Fetal heart rate (FHR) | Baseline FHR  |
| Dancause et al. 2012 | Canada | Prospective  | 111 | 5.5 | Objective and subjective stress (PNMS)\*  | Risk of obesity | Risk of obesity  (objective stress)  |
| Dancause et al. 2013 | Canada | Prospective  | 32 | 13.5 | Objective and subjective stress (PNMS)\*  | BMI, Body fat percentage, fasting and stimulated glucose and insulin, insulin secretion | BMI  (objective stress)BMI z-score (objective stress)Insulin secretion  (objective stress) |
| No associations with subjective stress |
| Dancause et al. 2015 | USA | Prospective  | 106 | 2.5-4 | Objective (IF100) and subjective distress (IES-R) \*\* | BMI, SS, TR, SS + TR, SS:TR ratio | BMI $-$Total adiposity Central adiposity $ -$ |
| Van Dijk et al. 2012 | The Netherlands  | Prospective longitudinal  | 2,939 | 5 | Job strain (JCQ)  | BMI, waist-to-height ratio (WHtR), fat mass index (FMI)  | BMI $-$WHtR $-$FMI $-$ |
| Van Dijk et al. 2012 | The Netherlands | Prospective longitudinal  | 2,624 | 5-6  | Cumulative stress score of five stress scales # | Heart rate (HR), Pre-ejection period (PEP), Respiratory sinus arrhythmia (RSA), Cardiac Autonomic Balance (CAB) | HR $-$PEP $-$RSA $-$CAB $-$ |
| Van Dijk et al. 2012 | The Netherlands  | Prospective longitudinal  | 2,968 | 5-7  | Cumulative stress score of five stress scales # | Blood pressure (BP) Risk for hypertension ## | Systolic BP Diastolic BPMean arterial pressure  |
| Van Dijk et al. 2014 | The Netherlands | Prospective longitudinal  | 1,952 | 5-6 | Cumulative stress score of five stress scales # | Fasting glucose, C-peptide, insulin resistance (HOMA-IR) | Fasting glucose $–$C-peptide $–$HOMA-IR $–$ |
| Ertel et al. 2010 | USA | Prospective  | 838 | 3  | Depression (EPDS)  | BMI, SS, TR, SS + TR, SS:TR ratio | BMI z-score Total adiposity $ -$Central adiposity  |
| Guxens et al. 2013 | The Netherlands | Population-based prospective  | 5,238 | 0,3-4 | Psychological distress (BSI) and family stress (FAD)  | Weight, heightBMI z-scoresRisk of overweight | Weight, height $-$BMI $-$Risk of overweight $-$ |
| Hohwü et al. 2015 | Denmark | Prospective  | 2,876 | 9-11 | Self-reported information on parental separation before child birth | BMIRisk of overweight | BMIRisk of overweight  |
| Ingstrup et al. 2012 | Denmark | Prospective  | 37,764 | 5-8  | Stress (GHQ-60), depression or anxiety (SCL-92)  | Risk of overweight | Risk of overweight $-$ |
| Li et al. 2010 | Denmark | Prospective  | 65,212 | 7-13  | Bereavement one year before birth (questionnaire) | BMIRisk of overweight (different ages) | BMI $-$ (before 10 years)Risk of overweight $-$(before 10 years) |
| BMI (after 10 years)Risk of overweight (after 10 years) |
| Milgrom et al. 2012 | Australia | Systematic review | 2 studies | 0,5 – 12  | Depression (EPDS)  | BMI, SS, TR, SS + TR, SS:TR ratio | Inconclusive findings |
| Monk et al. 2000 | USA | Case control | 17 | Fetal period | Anxiety (STPI)  | Fetal heart rate | FHR  |
| O’Connor et al. 2013 | USA | Prospective longitudinal  | 1,209 | 0,2 – 0,5 (2 and 6 months)  | Anxiety (PSWQ STAI, SCI for DSM-IV) | Cell-mediated immune response for interferon (IFN)-γ, Interleukin(IL)-2, and IL-4 responder cell frequencies  | No effect at 2 months  |
| IFN-γ  (at 6 months)IL-4 (at 6 months)IL-2 $–$ (at 6 months) |
| Park et al. 2018 | USA | Population-based  | 4,394 | 0-3 | Depression diagnosis (derived from SPARCS) | Weight and height for age, BMI   | Weight and height for age  (boys)BMI $–$ (boys) |
| Weight and height for age $-$ (girls)BMI $–$ (girls) |
| Taal et al. 2013 | The Netherlands | Population-based prospective  | 4,831 | 6 | Psychological distress (BSI)  | Blood pressure (BP), carotid –femoral pulse wave velocity, cardiac structures, fractional shortening | BP $–$Carotid-femoral pulse wave vel. $–$Left ventricular mass  Other cardiac structures $–$Fractional shortening $–$ |
| Wu et al. 2018 | Mexico | Prospective  | 424 | 4-6 | Composite stress index of four stress scales \*\*\* | Weight, height, fat mass, percentage body fat, waist circumference, BMI z-score | BMI Body fat mass  strongerPercentage body fat  for girlsWaist circumference  |
|  |
| \*= Outcomes were measured from (cord) blood samples, vibroacoustic stimulation, electro cardiograms, impedance cardiograms, echocardiographic measurements, air displacement plethysmography, bioelectrical impedance analysis, automatic oscillometric method for blood pressure, assessment of height, weight, waist circumference and using a Holtain caliper for subscapular and tricpes skinfold, questionnaires and clinical records.  |
| = positive direction of the observed association= negative direction of the observed association$-$ = no association observed |
| **Abbreviations:** BDI = Beck Depression Inventory, BMI = Body Mass Index, EPDS = Edinburgh Postnatal Depression Scale, GHQ-60 = General Health Questionnaire 60, IES-R = Impact of Event Scale-Revised: \*\* objective stress resulting from a natural disaster (flood) was assessed with questions specific to the flood and subjective stress was assessed using a questionnaire on women’s psychological reaction, IF-100 = Iowa Flood 100, PNMS = prenatal maternal stress: \* objective PNMS resulting from a natural disaster (storm) was assessed with questions specific to the storm and subjective PNMS was assessed using a validated French version of the Impact of Event Scale Revised, PSWQ = Penn State Worry Questionnaire, SCI = Structured Clinical Inventory for Diagnostic and Statistical Manual of Mental Disorders 4th edition (DSM-IV), SCL-92 = Symptoms Checklist-92, SPARCS = Statewide Planning and Research Cooperative System, a statewide reporting system for discharge data, SS = subscapular skinfold thickness, TR = triceps skinfold thickness, SS + TR as a measure of total adiposity, SS:TR ratio as a measure for central adiposity, STAI = State-Trait Anxiety Inventory, STPI = State Trait Personality Inventory , \*\*\* = Composite index made of Exposure to Violence questionnaire and The Crisis in Family Systems-Revised survey and EPDS and STAI = State-Trait Anxiety Inventory, # = Maternal cumulative stress score made of STAI and CES-D = Center for Epidemiological Studies Depression Scale and PRAQ = Pregnancy Related Anxieties Questionnaire and PDH = Parenting Daily Hassles and JCQ = Job Content Questionnaire, ## = using guidelines from the Fourth Report on the Diagnosis, Evaluation, and Treatment of High Blood Pressure in Children and Adolescents.  |

|  |
| --- |
| Table S3. Summary of literature on maternal psychological distress and child atopic outcomes. |
|  | **Country** | **Study Design** | **Sample size** | **Age of children****(years)** | **Maternal exposure and assessment during pregnancy** | **Child outcomes \***  | **Direction of the observed associations** |
| Chang et al. 2016 | Korea | Prospective  | 973 / 1,531 | 0.5 -5 | Depression (CESD), anxiety (STAI-T), distress (K6)  | Atopic dermatitis (eczema) | Eczema  |
| Elbert et al. 2016 | The Netherlands | Population-based prospective  | 5,205 | 0 - 10 | Depression, anxiety, overall stress (BSI)  | EczemaAllergic sensitization (for inhalant and food allergens) Allergy (inhalant, food)  | Eczema Allergic sensitization (inhalant, food) $-$Allergy (inhalant)  |
| Hartwig et al. 2014 | Australia | Population-based  | 1,587 | 7 and 14 | Negative life events  | EczemaAllergic rhinitis | Eczema 6y $-$, eczema 14y Allergic rhinitis 6 and 14y $-$ |
| Larsen et al. 2014 | Denmark | Population-based  | 32,270 | 7 | Psychological job strain  | Atopic dermatitis (eczema) | Eczema  |
| Lin et al. 2003 | Taiwan | Prospective  | 334 | 0 | Psychosocial stress (IQOLA SF-36) | Total IgE  | Total IgE  |
| McGowan et al. 2014 | USA | Prospective high risk | 516 | 0 - 5 | Stress and/or depression (Q) | Food allergy | Food allergy $-$ |
| Peters et al. 2012 | USA | Prospective  | 403 | 0 | Stress (CRISYS-R) | Total IgE  | Total IgE  |
| Reyes et al. 2011 | USA | Population-based  | 279 | 0 - 5 | Demoralization (PERI-D) | Total IgE, specific IgE  | Total IgE $-$Specific IgE$-$ |
| Sausental et al. 2009 | Germany | Prospective  | 3,004 | 0 - 6 | Stress-related factors (Q/records)  | Eczema | Eczema , until 2y only |
| Wang et al. 2013 | Taiwan | Prospective  | 11,962 | 3 | Work stress (Q) | Atopic dermatitis (eczema)  | Eczema  |
| Wen et al. 2011 | Taiwan | Birth study | 1,264 | 2 | Mental status (Q) | Atopic dermatitis (eczema) | Eczema  |
|  |
| \* = Outcomes were measured from (cord) blood samples by immunoCAP, immunoradiometric assay, UniCap IgE assay, or Phadia assay (total IgE, specific IgE for inhalant or food allergens) or skin prick tests (food and inhalant allergens), and by questionnaire, telephone interview, clinical history, clinician (eczema, allergic rhinitis, allergy), or combination of those.  |
| = positive direction of the observed association= negative direction of the observed association $-$ = no association observed |
| **Abbreviations:** BSI = Brief Symptom Inventory, CESD = Center for Epidemiological Studies-Depression, CRISYS-R = Crisis in Family Systems-Revised, IgE = Immunoglobulin E, IQOLA SF-36 = ‘Modified Chinese version of Short Form 36 Health Survey’, K6 = Kessler six-question psychological distress scale, PERI-D = Psychiatric Epidemiology Research Instrument – Demoralization, Q = Questionnaire not specified, R-CTS = Revised Conflict Tactics Scale, and STAI-T = State-Trait Anxiety Inventory-Trait.  |

|  |
| --- |
| Table S4. Summary of literature on maternal psychological distress and respiratory and child atopic outcomes. |
|  | **Country**  | **Study Design** | **Sample size** | **Age of children****(years)**  | **Maternal exposures and assessment during pregnancy** | **Child outcomes \***  | **Direction of the observed association** |
| Alton et al. 2013 | Canada | Randomized controlled trial  | 791 | 3 | Distress (SQ)  | Wheezing | Risk of wheezing $–$(all)Risk of wheezing (girls) |
| Bandoli et al. 2016 | USA | Population-based  | 1,193 | 0 – 6  | Pregnancy-related anxiety, chronic stress (PSS), negative life events | Lifetime wheezingCurrent wheezingAsthma | Risk of wheezing (pregnancy-related anxiety, negative life events)Risk of current wheezing  (pregnancy-related anxiety) |
| Risk of asthma $-$ |
| Beijers et al. 2010 | The Netherlands | Population-based | 174 | 0-1 | Anxiety (STAI), Pregnancy-related anxiety (PRAQ-R), daily hassles (APL), pregnancy-related daily hassles (PES) | Respiratory illness (several phenotypes including asthma) | Respiratory illnesses (PES) |
| Respiratory illnesses$-$(STAI, PRAQ-R, APL) |
| Brew et al. 2017ab | Sweden | Population-based  | 360,526 | 0-5 | Distress (medication for, or diagnosis of, an anxiety or depressive disorder) | Asthma | Risk of asthma  |
| Cheng et al. 2015 | Singapore | Population-based  | 1,152 | 0-1 | Anxiety (STAI) and depression (EPDS)  | Wheezing | Risk of wheezing (depression)Risk of wheezing $-$ (anxiety) |
| Chiu et al. 2012 | USA | Population-based  | 653 | 0-2 | Negative life events (NLEs) | Wheezing ( ≥ 2 episodes) | Risk of wheezing  (non-maternal sensitization , maternal sensitization $-$) |
| Cookson et al. 2009 | UK | Population-based  | 5,810 | 7.5 | Anxiety (CCEI) | Asthma  | Asthma  |
| Fang et al. 2011 | Sweden | Population-based  | 426,334 | 1-4 | Bereavement shortly before and during pregnancy  | Asthma  | Risk of asthma $ -$ |
| 493,813 | 7-12 |
| Guxens et al. 2014 | The Netherlands | Population-based  | 4,848 | 0-46 | Distress, depression, anxiety (BSI) | Wheezing (0-4) Asthma diagnosis (6)  | Risk of late wheezing Risk of persistent wheezing Risk of asthma $ -$ |
| Grizenko et al. 2015 | Canada | Case-control | 201 | 6-12  | Negative life events, scored on the DSM III and DSM-III-R axis IV scale | Asthma  | Risk of asthma  |
| Hartwig et al. 2014 | Australia | Population-based  | 994  | 614 | Negative life events  | Asthma  | Risk of asthma $ -$ (6 years)Risk of asthma $ $(14 years) |
| Khashan et al. 2012 | Sweden | Population-based  | 3,200,000 | 0-18 | Bereavement 6 month before or during pregnancy | Asthma | Risk of asthma  |
| Larsen et al. 2014 | Denmark | Population-based  | 32,271 | 7 | Psychological job strain (JCQ)  | Asthma  | Asthma without atopic dermatitis   |
| Asthma with atopic dermatitis $–$  |
| Lee et al. 2016 | USA | Population-based  | 765 | 0-6 | Negative life events (NLEs) | Asthma  | Risk of Asthma (boys , girls $-$) |
| Lee et al. 2017 | USA | Population-based  | 199 | 7 | Negative life events (NLEs)  | FEV1, FVC, FEF25-75, FEV1/FVC | FEV1 FVC FEF25-75FEV1/FVC $–$ |
| Lefevre et al. 2011 | France | Case-control  | 247 | 0-2 | Anxiety (STAI), depression (BDI) | Wheezing (>3 episodes) | Wheezing $–$ |
| Liu et al. 2015 | Denmark | Population-based  | 750,058 | 0-34-15 | Bereavement shortly before or during pregnancy | Asthma | Risk of asthma $ $(0-3years) |
| Risk of asthma $ -$ (4-15 years) |
| Magnus et al 2017 | Norway | Population-based  | 63,626 | 7 | Depression and anxiety (SCL-5)Negative life events  | Asthma  | Risk of asthma  |
| de Marco et al. 2012 | Italy | Cross-sectional  | 3,854 | 3-14 | Stressful life events (SLEP)  | WheezingAsthma | Risk of wheezing Risk of asthma  |
| O‘Connor et al. 2017 | USA | Population-based  | 442 | 4-7 | Depression (EPDS), stress during pregnancy (PSS) | Asthma | Risk of asthma $ -$ |
| Phelan et al. 2015 | USA | Population-based  | 2,802 | 0-1 | Stress (PHS) | Respiratory illness composite score (consisting of cough/cold, respiratory infections, asthma) | Respiratory illness  |
| Ramratnam et al. 2017 | USA | Population-based  | 467 | 0-3 | Depression (EPDS), stress during pregnancy (PSS) | Recurrent wheezing  | Risk of wheezing $-$ |
| Reyes et al. 2011 | USA | Population-based  | 279 | 0-5 | Psychological distress/ demoralization (PERID-D) | Wheezing  | Overall wheezing Transient wheezing Late onset wheezing $–$Persistent wheezing  |
| Rosa et al. 2016 | Mexico | Population-based  | 417 | 0-4 | Stress (CRISYS) | Ever wheezingCurrent wheezing  | Risk of ever wheezing (boys , girls $-$)Risk of current wheezing  |
| Smejda et al. 2018 | Poland | Population-based  | 370 | 0-1 | Stress (PSS), occupational stress (SWCQ), negative life events (SRRS) | Wheezing | Risk of wheezing (PSS, SRRS) |
| Trump et al. 2016 | Germany | Population-based  | 443 | 0-5 | Stress (PSQ) | Wheezing | Risk of wheezing  |
| Turcotte-Tremblay et al. 2014 | Canada | Population-based  | 68 | 0-12 | Objective stress (Storm32), subjective stress (IES-R), life events (LES), anxiety (GHQ-28) | WheezingAsthma  | Risk of wheezing and asthma (girls exposed to subjective stress) |
| No other significant associations |
| Wood et al. 2011 | USA | Birth cohort | 515 | 0-1 | Anxiety (PAS), depression (EPDS), stress (PSS) | Wheezing ( single (1 episode) and multiple (≥ 2 episodes)) | Multiple wheezing (depression, stress)Single wheezing (stress) |
| Multiple wheezing $– $(anxiety)Single wheezing $– $(depression, anxiety) |
| Zhou et al. 2017 | France | Population-based  | 1,139 | 0-5 | Depression (CES-D) | WheezingAsthma | Risk of wheezing $ -$ Risk of asthma $ -$  |
| Zijlmans et al. 2017 | The Netherlands | Population-based  | 174 | 2.5-6 | Anxiety (STAI), Pregnancy-related anxiety (PRAQ-R), daily hassles (APL), pregnancy-related daily hassles (PES) | Respiratory illness (several phenotypes including asthma) | Respiratory illnesses (PRAQ-R, anxiety (STAI)) |
| Respiratory illnesses $–$(APL, PES)  |
|  |
| \*= Outcomes were measured by spirometry, questionnaire, telephone interview, clinical history of contact, medication and/or hospitalization, clinical diagnosis (asthma) or a combination of those.  |
| = positive direction of the observed association= negative direction of the observed association$-$ = no association observed |
| Abbreviations: APL = Alledaagse Problemen lijst (Dutch), BDI = Beck Depression Inventory, BSI = Brief Symptom Inventory, CES-D = Center for Epidemiological Studies Depression scale, CRISYS = The Crisis in Family Systems – Revised survey, DSM-III/DSM-III-R = Diagnostic and Statistical Manual of Mental Disorders, EPDS = Edinburgh Post-natal Depression Scale, FAD = The McMaster Family Assessment Device, GHQ-28 = 28-item General Health Questionnaire, GHQ-60 = 60-item General health Questionnaire, IES-R = Impact of Event Scale-Revised, IF100 = Iowa Flood 100, JCQ = Job Content Questionnaire, Karasek’s Job Strain Model, LES = Life Experiences Survey, NLEs = negative life events score, PAS = Pregnancy Anxiety Scale, PERI-D = Psychiatric Epidemiology Research Instrument-Demoralization scale, PES = Pregnancy Experience Scale, PHS = Psychosocial Hassles Scale, PNMS = Prenatal Maternal Stress, PSS = Perceived Stress Scale, PSQ = Perceived Stress Questionnaire, SCL = Symptom Check List, SLEP = stressful life events during pregnancy, SRRS = Social Readjustment Rating Scale, SQ = The Symptom Questionnaire (includes anxiety and depression), STAI = State Trait Anxiety Inventory, Storm32 = Objective hardship score, SWCQ = Subjective Work Characteristics Questionnaire.  |

|  |
| --- |
| Table 5 Summary of literature on maternal psychological distress and child neurodevelopmental outcomes.  |
|  | **Country** | **Study Design** | **Sample size** | **Age of children****(years)** | **Maternal exposures and assessment during pregnancy** | **Child outcomes \*** | **Direction of the observed associations** |
| Atkinson et al. 2000 | $$-$$ | Meta-analyses | 2,064 (35 studies)  | 1-3 | Various depression measures #  | Attachment (SS or modified SS or Attachment Q-set)  | Attachment security  |
| Van den Berg et al 2004 | Belgium | Prospective follow-up | 71 | 8-9  | Anxiety (STAI) in second and third trimester | Four composites: ADHD symptoms, externalizing problems, internalizing problems, anxiety (CBCL, TRF, CATRS, STAIC) | ADHD symptoms, externalizing problems, anxiety  (Anxiety in second trimester) |
| No other associations |
| Davis et al. 2004 | USA | Longitudinal  | 22 | 0.3 | Depression (CES-D) and anxiety (STAI)  | Behavioral reactivity (HIBRP)  | Negative behavioral reactivity to novelty(STAI and CES-D) |
| Deave et al. 2008 | UK | Prospective  | 11,098 | 1.5  | Depression (EPDS) | Development (Modified DDST) | Developmental delay  |
| DiPietro et al 2006 | USA | Longitudinal  | 94 | 2  | Anxiety (POMS, STAI), depression (POMS, CES-D), stress (DSI, PSS, PES) | Development (BSID)  | Motor development (anxiety, general stress, depression ) |
| Mental development  (anxiety, depression) |
| Field et al. 2009/2010 | USA | Narrative review  | Unknown  | 0-0.5 | Depression (CES-D, SCID)  | Responses to different stimuli (faces, voices ea)  | Responses to different stimuli  |
| Henrichs et al. 2009 | The Netherlands | Population-based prospective | 2,997 | 0.5  | Pregnancy-specific anxiety (POQ) and anxiety (BSI)  | Temperament (IBQ-R) | Activity and sadness (POQ and BSI) |
| Fearfulness (POQ) |
| Distress to limitations (BSI) |
| Laplante et al 2008 | Canada | Longitudinal  | 89 | 5.5  | Objective stress (Storm32), subjective stress (IES-R)  | IQ and language ability ## |  Full Scale IQs  Verbal IQs Objective stress Language abilities  |
| No associations with subjective stress |
| Li et al. 2013 | Australia  | Longitudinal  | 1,038 | 10  | Negative life events  | School achievement (using WALNA)  | Reading skills  (in girls)Reading skills, mathematic and writing scores (in boys) |
| Luoma et al 2004 | Finland | Prospective  | 165 | 8-9  | Depression (EPDS)) | Behavior (CBCL) | Problem level  |
| Niederhofer et al. 2004 | Austria | Longitudinal  | 227 | 6  | Stress (unknown questionnaire)  | School marks | School marks  |
| O’Conner et al 2007 | UK | Prospective  | 10,323 | 0.5, 1.5 and 2.5 | Depression (EPDS), anxiety (CCEI)  | Sleep problems (parent reports)  | Sleep problems (depression and anxiety) |
| O’Conner et al 2002 | UK | Prospective  | 7,144 | 4  | Anxiety (CCEI) | Behavioral and emotional problems (SDQ)  | Behavioral and emotional problems (also after adjustment for postnatal anxiety)  |
| Van der Wal et al. 2007 | The Netherlands | Longitudinal  | 4,976 | 0.3-0.5 | Depression (CES-D), pregnancy-specific anxiety (PRAQ), parenting stress (PDH), job strain (WEAQ) | Excessive crying  | Excessive crying (CES-D, PRAQ, PDH, QEAQ) |
| Whitehouse et al 2010 | Australia | Longitudinal  | 2,601 | 10  | Negative life events  | Language ability (PPVT-R)  | Language ability $-$ |
| Yong Ping et al. 2015 | USA | Longitudinal  | 94 | 2.5 | Objective stress (IF100) and subjective stress (IES-R) | Stress reactivity (cortisol levels/increase after stress situation)  | Cortisol increase  (Objective and subjective stress) |
| **Childhood neuroimaging outcomes: using structural and functional magnetic resonance imaging (MRI) and diffusion tensor imaging (DTI)**  |
| Lebel et al. 2016 | USA | Prospective  | 52 | 2.6 – 5.1  | Depression (EPDS) | Cortical thickness and white matter structure (FA, RD, AD, MD)  | Cortical thickness in right inferior frontal and middle temporal regions RD and MD in white matter emanating from the inferior frontal area  |
| El Marroun et al. 2016 | The Netherlands | Population-based prospective | 654 | 6-10  | Depression (BSI)  | Structural neuroimaging data: cortical thickness, surface area, gyrification | Superior frontal cortex in left hemisphere Caudal middle frontal area in left hemisphere  |
| No other associations |
| El Marroun et al. 2018 | The Netherlands | Population-based prospective  | 636 | 6-9  | Depression (BSI)  | White matter microstructure (FA, MD)  | MD in the uncinate fasciculus  |
| FA and MD in the cingulum bundle |
| Qiu et al. 2015  | Singapore | Prospective  | 42 | 0.5 | Depression (EPDS) | Amygdala functional connectivity  | Amygdala functional connectivity with several brain regions |
| Rifkin-Graboi et al. 2013 | Singapore | Prospective  | 157 | 0-0.1 | Depression (EPDS) | Amygdala volume and microstructure (FA, AD)  | FA and AD  in right amygdala |
| FA in left amygdala |
| Volume amygdala $-$ |
| Sandman et al 2015 | USA | Prospective longitudinal  | 81 | 6-9  | Depression (CES-D, BDI) | Cortical thickness  | Cortical thickness  |
| Wen et al. 2017 | Singapore | Prospective  | 235 | 4.5  | Depression (EPDS) | Amygdala volume and white matter microstructure (FA)  | Right amygdala volume (only in girls)  |
| No other associations |
|  |
| \*=Outcomes were measured from blood samples, questionnaires, parent reports, responses to different stimuli, IQ tests, school marks, MRI or DTI.  |
| = positive direction of the observed association= negative direction of the observed association$-$ = no association observed |
| Abbreviations exposures: BSI = Brief Symptom Inventory, BDI = Beck Depression Inventory, CCEI = Crown-Crisp experiential index, CES-D = Center for Epidemiological Studies Depression Inventory, DSI = Daily Stress Inventory, DSM-III = Diagnostic and Statistical Manual of Mental Disorders, 3rd edition, EPDS = Edinburgh Post-natal Depression Scale, FAD = The McMaster Family Assessment Device, GHQ-60 = 60-item General health Questionnaire, IES-R = Impact of Event Scale-Revised, IF100 = Iowa Flood 100, MMPI-2 = Minnesota Multiphasic Personality Inventory, 2nd edition, Modified DDST = modified Denver Developmental Screening Test, PDH = Parenting Daily Hassles, PES = Pregnancy-specific stress, PNMS = Prenatal Maternal Stress, POMS-D = Profile of Mood States-Depression Scale, POQ = Pregnancy Outcome Questionnaire, PPVT-R = Peabody Picture Vocabulary Test-Revised, PSS = Perceived Stress Scale, PRAQ = Pregnancy Related Anxiety Questionnaire, SADS = Schedule for Affective Disorders and Schizophrenia, SCID = Structured Clinical Interview for DSM-IV, SS = Strange Situation, STAI = State-Trait Anxiety Inventory, Storm32 = Objective hardship score, WEAQ = Work Experience and Appreciation Questionnaire based on the Job Content Instrument of Karasek et al, # BDI, POMS-D, DSM-II, CESD-D, EPDS, SADS, MMPI-2 |
| Abbreviations outcomes: AD = Axial Diffusivity, BSID = Bayley Scales of Infant Development , CATRS = Conners Abbreviated Teacher Rating Scale, CBCL = Child Behavior Checklist, FA = Fractional anisotropy, HIBRP = Harvard Infant Behavioral Reactivity Protocol, IBQ-R = Infant Behavior Questionnaire-Revised, MD = mean diffusivity, RD = radial diffusivity, SDQ = Strengths and Difficulties Questionnaire, STAIC = State Trait Anxiety Scale for Children, TRF = Teacher’s Report Form, WALNA = Western Australian Literacy and Numeracy Assessment, ## =Wechsler Preschool and Primary Scale of Intelligence-Revised (IQ) and Peabody Picture Vocabulary Test-Revised |

Inhalant allergens comprised

house dust mite (Dermatophagoides pteronyssinus),

ﬁve-grass mixture (Dactylis glomerata, Festuca praten-

sis, Lolium perenne, Phleum pratense and Poa praten-

sis), birch (Betula verrucosa), cat (Felis catus) and dog

(Canis familiaris) (ALK-Ab ell



o B.V., Almere, the Nether-

lands). Food allergens comprise d hazelnut, cashew nut,

peanut and peach extracts

Inhalant allergens comprised

house dust mite (Dermatophagoides pteronyssinus),

ﬁve-grass mixture (Dactylis glomerata, Festuca praten-

sis, Lolium perenne, Phleum pratense and Poa praten-

sis), birch (Betula verrucosa), cat (Felis catus) and dog

(Canis familiaris) (ALK-Ab ell



o B.V., Almere, the Nether-

lands). Food allergens comprise d hazelnut, cashew nut,

peanut and peach extracts [17 – 19].