**Supplementary Material**

**Supplementary Table S1. Overview NTR survey questions and outcome definitions regarding early-life antibiotic use, ASD and ADHD**

|  |  |  |  |
| --- | --- | --- | --- |
| **Survey item** | **Intended age** | **Outcome Definition** |  |
| **antibiotic use** | 0-2 years | Use of antibiotics |  |
| **adhd**  **Sensitivity Analysis ADHD** | 7-12 years  7-12 years | A T-score above 65 derived from scores from the whole NTR population based on the scores of the Conners ADHDindex 37 and controls of 65 and lower.  A T-score above 65 derived from scores from the whole NTR population based on the scores of the Conners ADHDindex 37 and controls of 55 and lower. |  |
|  |  |  |  |
| **ASD**  **Sensitivity analysis ASD** | 7-12 years  7-12 years | A T-score above 65 derived from scores from the whole NTR population based on the scores of the 10-item CBCL scale 38 and controls of 65 and lower.  A T-score above 65 derived from scores from the whole NTR population based on the scores of the 10-item CBCL scale 38 and controls of 55 and lower. |  |

**Supplementary Table S2. Overview CATSS survey questions and outcome definitions regarding early-life antibiotic use, ADHD and autism**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Survey item** | **Intended age** | **Outcome Definition** |  |  | **CODES** |
| **antibiotic use** | 0-2 years | Use of antibiotics  Diagnosis of ADHD based on the A-TAC questionnaire  Cutoffs: 6.0 and 12.5 39  Diagnosis of ASD based on the A-TAC questionnaire  Cutoffs: 4.5 and 8.5 39 | | | ATC code J01 |
| **ADHD ATAC** | 9 years | Modules Concentration and attention and Impulsiveness and activity: |
| **ASD ATAC** | 9 years | Modules Language, Social interaction and Flexibility. |
| **ADHD Diagnosis** | 9 years | ICD 10-code: F90 49 | | |  |
| **ASD DIAGNOSIS** | 9 years | ICD 10-code: F84, but not F84.4 or F84.3 49 | | |  |
| **Anti-AERoBIC ANTIBIOTICS** | 0-2 years | Use of the following antibiotics: tetracyclines other than tigecycline, beta-lactamase sensitive penicillins, penicillins with extended spectrum, beta-lactamase resistant penicillins, cephalosporins other than cefoxitin, cefmetazole and flomoxef, monobactams, sulfonamides and trimethoprim, macrolides, aminoglycosides, quinolones other than moxifloxacin, glycopeptides, polymyxins, nitrofuran derivates, fusidic acid, fosfomycin, linezolid, spectinomycin, daptomycin. 44 | | | ATC codes: J01AA01, J01AA02, J01AA03, J01AA04, J01AA05, J01AA06, J01AA07, J01AA08, J01AA09, J01AA10, J01AA11, J01AA13, J01AA20, J01AA56, J01CA, J01CE, J01CF, J01DC02, J01DC03, J01DC04, J01DC05, J01DC06, J01DC07, J01DC08, J01DC10, J01DC11, J01DC12, J01DC13, J01DF, J01EE, J01FA, J01G, J01MA01, J01MA02, J01MA03, J01MA04, J01MA05, J01MA06, J01MA08, J01MA09, J01MA10, J01MA11, J01MA12, J01MA13, J01MA15, J01MA16, J01MA17, J01MA18, J01MA19, J01MA21, J01MA22, J01MA23, J01MB, J01XA, J01XB, J01XE, J01XC01, J01XX01, J01XX08, J01XX04, J01XX09. |
| **Anti-AnEAROBIC ANTIBIOTICS** | 0-2 years | Use of the following antibiotics: tigecycline, ampicillin and enzyme inhibitors, amoxicillin and enzyme inhibitors, ticarcillin and enzyme inhibitors, pipracillin and enzyme inhibitors, cefoxitin, cefmetazole, flomoxef, meropenem, ertapenem, imipenem and enzyme inhibitors, clindamycin, moxifloxacin, metronidazole. 44 | | | ATC code: J01AA12, J01CR01, J01CR02, J01DC01, J01CR03, J01CR05, J01DC09, J01DC14, J01DH02, J01DH03, J01DH51, J01FF01, J01MA14, J01XD01. |
| **SMalL Spectrum ANTIBIOTICS** | 0-2 years | Use of the following antibiotics: vancomycin (oral), benzylpenicillin, phenoxymethylpenicillin, dicloxacillin, flucloxacillin, cephalexine, aztreonam, trimethoprim, sulfamethizole, erythromycin, roxithromycin, clarithromycin, azithromycin, clindamycin, vancomycin, teicoplanin, fusic acid, metronidazole (intravenous), fusidic acid, metronidazole, nitrofurantoin, linezolide, daptomycin, rifampicin, rifabutin, metronidazole. 43 | | | ATC code: A07AA09, J01CE01, J01CE02, J01CF01, J01CF05, J01DB01, J01DF01, J01EA0, J01EB02, J01FA01, J01FA06, J01FA09, J01FA10, J01FF01, J01XA01, J01XA02, J01XC01, J01XD01, J01XE01, J01XX08, J01XX09, J04AB02, J04AB04, P01AB01. |
| **BROAD SpECTRUM ANTIBIOTICS** | 0-2 years | Use of the following antibiotics: doxycycline, lymecline, tetracyclines, tigecycline, ampicillin, pivampicillin, amoxicillin, pivmecillinam, mecillinam, amoxicillin-clavulanic acid, piperacillin-tazobactam, cefuroxime, cefataxime, ceftazidime, ceftriaxone, meropenem, ertapenem, sulfamethoxazole-trimethoprim, tobramycin, gentamycin, ofloxacin, ciprofloxacin, moxifloxacin, colistinmethatnatrium, 43 | | | ATC code: J01AA01, J01AA04, J01AA07, J01AA12, J01CA01, J01CA02, J01CA04, J01CA08, J01CA11, J01CR02, J01CR05, J01DC02, J01DD01, J01DD02, J01DD04, J01DH02, J01DH03, J01EE01, J01GB01, J01GB03, J01MA01, J01MA14, J01XB01. |

**Supplementary Table S3. Risk of high cut off ADHD due to early-life antibiotic use in CATSS**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | **n AB/ADHD (%)** | **n AB/without ADHD (%)** | **OR adjusted (95% CI)** |
| **CATSS** | **Unmatched** | 119/227 (52.4%) | 3,391/7,611 (44.6%) | 1.49 (1.13-1.96)\*\* # |
|  | **MZ and same sex DZ** | 47/89 (52.8%) | 46/89 (51.7%) | 1.14 (0.42-3.07)§ |
|  | **Same sex DZ** | 30/56 (53.6%) | 27/56 (48.2%) | 1.64 (0.48-5.57)§ |
|  | **MZ** | 17/33 (51.5%) | 16/3 (8.5%) | 0.37 (0.04-3.76)§ |

AB: users of any antibiotics, MZ: monozygotic twin pair level, DZ: dizygotic twin pair level, OR: odds ratio, CI: confidence interval, \* p < 0.05, \*\* p < 0.01, \*\*\* p < 0.001, # adjusted for: : gender, delivery mode, educational attainment, birth weight, asthma § adjusted for: birth weight.

**Supplementary Table S4. Risk of high cut off ASD due to early-life antibiotic use in CATSS**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | **n AB/ASD (%)** | **n AB/without ASD (%)** | **OR adjusted (95% CI)** |
| **CATSS** | **Unmatched** | 48/111 (43.2%) | 3,498/7,782 (44.9%) | 1.33 (0.82-2.17)# |
|  | **MZ and same sex DZ** | 11/20 (55.0%) | 8/20 (49.0%) | Insufficient power§ |
|  | **Same sex DZ** | 9/16 (56.3%) | 6/16 (37.5%) | Insufficient power§ |
|  | **MZ** | 2/4 (50.0%) | 2/4 (50.0%) | Insufficient power§ |

AB: users of any antibiotics, MZ: monozygotic twin pair level, DZ: dizygotic twin pair level, OR: odds ratio, CI: confidence interval, \* p < 0.05, \*\* p < 0.01, \*\*\* p < 0.001, # adjusted for: : gender, delivery mode, educational attainment, birth weight, asthma, § adjusted for: birth weight, asthma.

**Supplementary Table S5. Risk of ADHD due to early-life antibiotic use in NTR with a more strict definition of controls**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | **n AB/ADHD (%)** | **n AB/without ADHD (%)** | **OR adjusted (95% CI)** |
| **NTR** | **Unmatched** | 1,103/2,981 (37.0%) | 5,055/14,752 | 1.09 (1.01-1.17)\* # |
|  | **MZ and same sex DZ** | 243/635 (38.3%) | 257/635 (40.5%) | 0.69 (0.47-1.03) § |
|  | **Same sex DZ** | 189/493 (38.3%) | 202/493 (41.0%) | 0.62 (0.40-0.96) § |
|  | **MZ** | 54/141 (38.3%) | 55/141 (39.0%) | 1.03 (0.40-2.66) § |

AB: users of any antibiotics, MZ: monozygotic twin pair level, DZ: dizygotic twin pair level, OR: odds ratio, CI: confidence interval, \* p < 0.05, \*\* p < 0.01, \*\*\* p < 0.001,  # adjusted for: : gender, delivery mode, educational attainment, birth weight, asthma § adjusted for: birth weight, asthma.

**Supplementary Table S6. Risk of ASD due to early-life antibiotic use in NTR with a more strict definition of controls**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | **n AB/ASD (%)** | **n AB/without ASD (%)** | **OR adjusted (95% CI)** |
| **NTR** | **Unmatched** | 1,133/2,977 (38.1%) | 5,663/16,730 (33.8%) | 1.16 (1.08-1.26) \*\*\*# |
|  | **MZ and same sex DZ** | 272/686 (39.7%) | 269/686 (39.2%) | 1.09 (0.74-1.60)§ |
|  | **Same sex DZ** | 193/489 (39.5%) | 187/489 (38.2%) | 1.17 (0.76-1.81) § |
|  | **MZ** | 79/197 (40.1%) | 82/197 (41.6%) | 0.83 (0.36-1.96) § |

AB: users of any antibiotics, MZ: monozygotic twin pair level, DZ: dizygotic twin pair level, OR: odds ratio, CI: confidence interval, \* p < 0.05, \*\* p < 0.01, \*\*\* p < 0.001,  # adjusted for: gender, delivery mode, educational attainment, birth weight, asthma, § adjusted for: birth weight, asthma.

**Supplementary Table S7. Risk of ADHD and ASD due to early-life narrow spectrum antibiotic use in CATSS**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | **n AB/ADHD (%)** | **n AB/without ADHD (%)** | **OR adjusted (95% CI)** |
| **CATSS** | **Unmatched** | 448/1,070 (45.6%) | 2,318/6,179 (35.7%) | 1.02 (0.90-1.15)£ |
|  | **MZ and same sex DZ** | 178/439 (40.5%) | 169/439 (38.5%) | 1.13 (0.76-1.68)§ |
|  | **Same sex DZ** | 115/278 (41.4%) | 106/278 (38.1%) | 1.11 (0.66-1.87)§ |
|  | **MZ** | 63/161 (39.1%) | 63/161 (39.1%) | 0.99 (0.52-1.91)§ |
|  |  | **n AB/ASD (%)** | **n AB/without ASD (%)** | **OR adjusted (95% CI)** |
| **CATSS** | **Unmatched** | 147/350 (42.0%) | 2,832/7,466 (37.9%) | 1.16 (0.86-1.58)× |
|  | **MZ and same sex DZ** | 39/81 (48.1%) | 39/81 (48.1%) | 0.94 (0.39-2.23)¥ |
|  | **Same sex DZ** | 27/49 (55.1%) | 22/49 (44.9%) | 1.26 (0.43-3.66)¥ |
|  | **MZ** | 12/32 (37.5%) | 14/32 (43.8%) | 0.47 (0.08-2.80)¥ |

AB: users of any antibiotics, broad spectrum antibiotics: doxycycline, lymecline, tetracyclines, tigecycline, ampicillin, pivampicillin, amoxicillin, pivmecillinam, mecillinam, amoxicillin-clavulanic acid, piperacillin-tazobactam, cefuroxime, cefataxime, ceftazidime, ceftriaxone, meropenem, ertapenem, sulfamethoxazole-trimethoprim, tobramycin, gentamycin, ofloxacin, ciprofloxacin, moxifloxacin, colistinmethatnatrium, small spectrum antibiotics: vancomycin (oral), benzylpenicillin, phenoxymethylpenicillin, dicloxacillin, flucloxacillin, cephalexine, aztreonam, trimethoprim, sulfamethizole, erythromycin, roxithromycin, clarithromycin, azithromycin, clindamycin, vancomycin, teicoplanin, fusic acid, metronidazole (intravenous), fusidic acid, metronidazole, nitrofurantoin, linezolide, daptomycin, rifampicin, rifabutin, metronidazole, MZ: monozygotic twin pair level, DZ: dizygotic twin pair level, OR: odds ratio, CI: confidence interval, \* p < 0.05, \*\* p < 0.01, \*\*\* p < 0.001, § adjusted for birth weight, asthma, broad spectrum antibiotics £ adjusted for: gender, delivery mode, educational attainment, birth weight, asthma, broad spectrum antibiotics, ≠ adjusted for: broad spectrum antibiotics, × adjusted for: : gender, delivery mode, educational attainment, birth weight, asthma, broad spectrum antibiotics, ¥ adjusted for: birth weight, broad spectrum antibiotics.

**Supplementary Table S8. Risk of ADHD and ASD due to early-life broad spectrum antibiotic use in CATSS**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | **n AB/ADHD (%)** | **n AB/without ADHD (%)** | **OR adjusted (95% CI)** |
| **CATSS** | **Unmatched** | 256/1,070 (23.9%) | 1,145/6,179 (18.5%) | 1.19 (1.02-1.39)\*£ |
|  | **MZ and same sex DZ** | 93/439 (21.2%) | 86/439 (19.6%) | 1.35 (0.77-2.36)§ |
|  | **Same sex DZ** | 63/278 (22.7%) | 54/278 (19.4%) | 1.77 (0.91-3.44)§ |
|  | **MZ** | 30/161 (18.6%) | 32/161 (19.9%) | 0.64 (0.20-2.05)§ |
|  |  | **n AB/ASD (%)** | **n AB/without ASD (%)** | **OR adjusted (95% CI)** |
| **CATSS** | **Unmatched** | 75/1,505 (5.0%) | 275/6,311 (4.4%) | 1.13 (0.79-1.60)× |
|  | **MZ and same sex DZ** | 22/81 (27.2%) | 22/81 (27.2%) | 0.92 (0.25-3.39)¥ |
|  | **Same sex DZ** | 15/49 (30.6%) | 14/49 (28.6%) | 0.93 (0.22-4.02)¥ |
|  | **MZ** | 7/32 (21.9%) | 8/32 (25.0%) | Insufficient power¥ |

AB: users of any antibiotics, broad spectrum antibiotics: doxycycline, lymecline, tetracyclines, tigecycline, ampicillin, pivampicillin, amoxicillin, pivmecillinam, mecillinam, amoxicillin-clavulanic acid, piperacillin-tazobactam, cefuroxime, cefataxime, ceftazidime, ceftriaxone, meropenem, ertapenem, sulfamethoxazole-trimethoprim, tobramycin, gentamycin, ofloxacin, ciprofloxacin, moxifloxacin, colistinmethatnatrium, small spectrum antibiotics: vancomycin (oral), benzylpenicillin, phenoxymethylpenicillin, dicloxacillin, flucloxacillin, cephalexine, aztreonam, trimethoprim, sulfamethizole, erythromycin, roxithromycin, clarithromycin, azithromycin, clindamycin, vancomycin, teicoplanin, fusic acid, metronidazole (intravenous), fusidic acid, metronidazole, nitrofurantoin, linezolide, daptomycin, rifampicin, rifabutin, metronidazole, MZ: monozygotic twin pair level, DZ: dizygotic twin pair level, OR: odds ratio, CI: confidence interval, \* p < 0.05, \*\* p < 0.01, \*\*\* p < 0.001, § adjusted for birth weight, asthma, small spectrum antibiotics £ adjusted for: gender, delivery mode, educational attainment, birth weight, asthma, small spectrum antibiotics, ≠ adjusted for: small spectrum antibiotics, × adjusted for: gender, delivery mode, small spectrum antibiotics, birth weight, educational attainment, ¥ adjusted for: birth weight, small spectrum antibiotics.

**Supplementary Table S9. Risk of ADHD and ASD due to anti-anaerobic antibiotic use in CATSS**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | **n AB/ADHD (%)** | **n AB/without ADHD (%)** | **OR adjusted (95% CI)** |
| **CATSS** | **Unmatched** | 98/1,070 (9.2%) | 473/6,179 (7.6%) | 1.04 (0.83-1.29)£ |
|  | **MZ and same sex DZ** | 31/439 (7.1%) | 28/439 (6.4%) | 1.30 (0.55-3.09)§ |
|  | **Same sex DZ** | 22/278 (7.9%) | 21/278 (7.6%) | 1.14 (0.45-2.88)§ |
|  | **MZ** | 9/161 (5.6%) | 7/161 (4.3%) | Insufficient power§ |
|  |  | **n AB/ASD (%)** | **n AB/without ASD (%)** | **OR adjusted (95% CI)** |
| **CATSS** | **Unmatched** | 29/350 (8.3%) | 574/7,466 (97.7%) | 1.08 (0.67-1.72)× |
|  | **MZ and same sex DZ** | 11/81 (13.6%) | 7/81 (8.6%) | Insufficient power¥ |
|  | **Same sex DZ** | 4/49 (8.2%) | 7/49 (14.3%) | Insufficient power¥ |
|  | **MZ** | 3/32 (9.4%) | 4/32 (12.5%) | Insufficient power¥ |

AB: users of any antibiotics, anti-anaerobic antibiotics: : tigecycline, ampicillin and enzyme inhibitors, amoxicillin and enzyme inhibitors, ticarcillin and enzyme inhibitors, pipracillin and enzyme inhibitors, cefoxitin, cefmetazole, flomoxef, meropenem, ertapenem, imipenem and enzyme inhibitors, clindamycin, moxifloxacin, metronidazole, anti-aerobic antibiotics: tetracyclines other than tigecycline, beta-lactamase sensitive penicillins, penicillins with extended spectrum, beta-lactamase resistant penicillins, cephalosporins other than cefoxitin, cefmetazole and flomoxef, monobactams, sulfonamides and trimethoprim, macrolides, aminoglycosides, quinolones other than moxifloxacin, glycopeptides, polymyxins, nitrofuran derivates, fusidic acid, fosfomycin, linezolid, spectinomycin, daptomycin, MZ: monozygotic twin pair level, DZ: dizygotic twin pair level, OR: odds ratio, CI: confidence interval, \* p < 0.05, \*\* p < 0.01, \*\*\* p < 0.001, § adjusted for birth weight, asthma, anti-aerobic antibiotics £ adjusted for: gender, delivery mode, educational attainment, birth weight, asthma, anti-aerobic antibiotics, ≠ adjusted for: anti-aerobic antibiotics, × adjusted for: gender, delivery mode, anti-aerobic antibiotics, birth weight, educational attainment, asthma ¥ adjusted for: birth weight, anti-aerobic antibiotics.

**Supplementary Table S10. Risk of ADHD and ASD due to early-life anti-aerobic antibiotic use in CATSS**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | **n AB/ADHD (%)** | **n AB/without ADHD (%)** | **OR adjusted (95% CI)** |
| **CATSS** | **Unmatched** | 515/1,070 (48.1%) | 2,555/6,179 (41.3%) | 1.29 (1.10-1.51)\*\*£ |
|  | **MZ and same sex DZ** | 199/439 (45.3%) | 185/439 (42.1%) | 1.29 (0.85-1.95)§ |
|  | **Same sex DZ** | 129/278 (46.4%) | 113/278 (40.6%) | 1.52 (0.90-2.57)§ |
|  | **MZ** | 72/161 (44.7%) | 70/161 (43.5%) | 0.81 (0.39-1.67)§ |
|  |  | **n AB/ASD (%)** | **n AB/without ASD (%)** | **OR adjusted (95% CI)** |
| **CATSS** | **Unmatched** | 163/350 (46.6%) | 3,141/7,466 (42.1%) | 1.29 (0.96-1.73)× |
|  | **MZ and same sex DZ** | 43/81 (53.1%) | 41/81 (50.6%) | 1.53 (0.52-4.52)¥ |
|  | **Same sex DZ** | 29/49 (59.2%) | 26/49 (53.1%) | 2.85 (0.67-12.06)¥ |
|  | **MZ** | 14/32 (4.4%) | 15/32 (46.9%) | 0.29 (0.02-4.50)¥ |

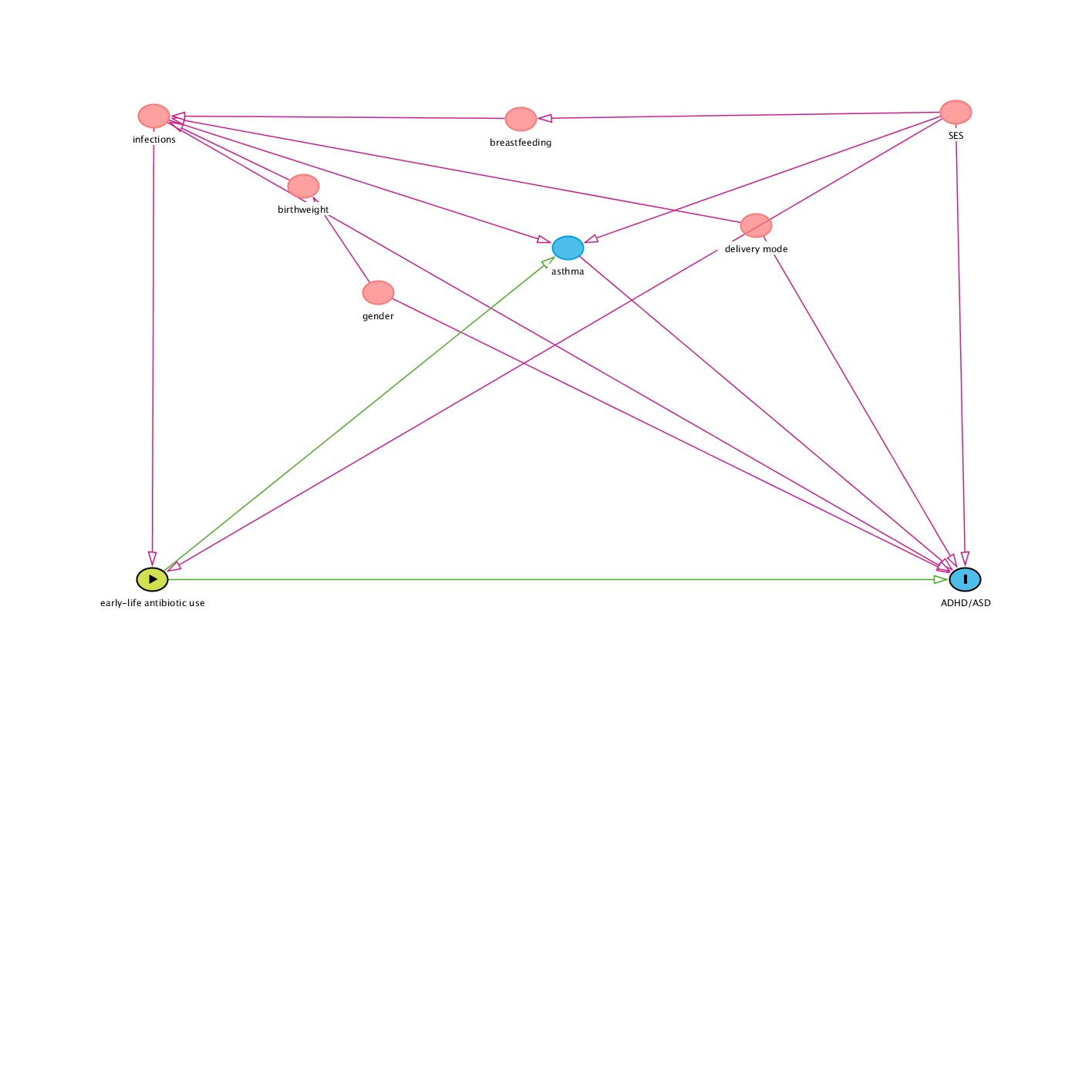
AB: users of any antibiotics, anti-anaerobic antibiotics: : tigecycline, ampicillin and enzyme inhibitors, amoxicillin and enzyme inhibitors, ticarcillin and enzyme inhibitors, pipracillin and enzyme inhibitors, cefoxitin, cefmetazole, flomoxef, meropenem, ertapenem, imipenem and enzyme inhibitors, clindamycin, moxifloxacin, metronidazole, anti-aerobic antibiotics: tetracyclines other than tigecycline, beta-lactamase sensitive penicillins, penicillins with extended spectrum, beta-lactamase resistant penicillins, cephalosporins other than cefoxitin, cefmetazole and flomoxef, monobactams, sulfonamides and trimethoprim, macrolides, aminoglycosides, quinolones other than moxifloxacin, glycopeptides, polymyxins, nitrofuran derivates, fusidic acid, fosfomycin, linezolid, spectinomycin, daptomycin, MZ: monozygotic twin pair level, DZ: dizygotic twin pair level, OR: odds ratio, CI: confidence interval, \* p < 0.05, \*\* p < 0.01, \*\*\* p < 0.001, § adjusted for birth weight, asthma, anti-anaerobic antibiotics £ adjusted for: gender, delivery mode, educational attainment, birth weight, asthma, anti-anaerobic antibiotics, ≠ adjusted for: anti-anaerobic antibiotics, × adjusted for: gender, delivery mode, anti-anaerobic antibiotics, birth weight, ¥ adjusted for: birth weight, anti-anaerobic antibiotics.

Supplementary Table S11. Summary characteristics of both twin cohorts and subgroups with ASD and ADHD with high cutoff numbers, and healthy controls in CATSS.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **ADHD**  **High cutoff**  (n=227) | **No ADHD**  (n=7,719) | **ASD**  **High cutoff**  (n=111) | **No ASD**  (n=7,835) |
| **Gender** |  |  |  |  |
| Male | 158 (69.6%) | 3,820 (49.4%) | 85 (76.6%) | 3,893 (49.7%) |
| **Delivery mode** |  |  |  |  |
| Caesarean section | 91 (51.1%) | 3,174 (52.1%) | 41 (56.9%) | 3,224 (52.0%) |
| **Gestational age** |  |  |  |  |
| < 37 wk | 132 (58.1%) | 4,151 (53.8%) | 68 (61.3%) | 4,215 (53.8%) |
| **Birth weight (g)** | 2,624 (795) | 2,670 (716) | 2,705 (792) | 2,670 (720) |
| **Breast feeding** | NA | NA | NA | NA |
| None |  |  |  |  |
| < 2 wk |  |  |  |  |
| 2-6 wk |  |  |  |  |
| 6 wk– 3 mths |  |  |  |  |
| 3-6 mths |  |  |  |  |
| > 6 mths |  |  |  |  |
| **Area type during early-life** |  |  |  |  |
| Rural area | 81 (36.4%) | 2,319 (30.1%) | 39 (35.8%) | 2,361 (30.2%) |
| **Older siblings** |  |  |  |  |
| None | 43 (24.2%) | 1,354 (22.2%) | 13 (18.1%) | 1,384 (22.3%) |
| **Allergies**  Cowmilk | 25 (11.2%) | 453 (6.0%) | 16 (14.4%) | 462 (6.0%) |
| Gluten | 3 (1.3%) | 60 (0.8%) | 2 (1.8%) | 61 (0.8%) |
| Other food | 3 (1.3%) | 108 (1.4%) | 3 (2.7%) | 108 (1.4%) |
| Hay fever | 11 (4.8%) | 439 (5.7%) | 8 (7.2%) | 442 (5.6%) |
| Other | 3 (2.7%) | 280 (3.6%) | 3 (2.7%) | 280 (3.6%) |
| **Outside home child care** | NA | NA | NA | NA |
| None |  |  |  |  |
| 1-4 h/wk |  |  |  |  |
| 5-8 h/wk |  |  |  |  |
| 9-16 h/wk |  |  |  |  |
| 17-24 h/wk |  |  |  |  |
| >24 h/wk |  |  |  |  |
| **educational attainment mother**  ≤ 9 years | 11 (5.4%) | 155 (2.2%) | 6 (6.3%) | 160 (2.3%) |
| 10-12 years | 83 (40.7%) | 1,851 (26.8%) | 45 (46.9%) | 1,889 (27.0%) |
| < 2 years tertiary | 32 (15.7%) | 930 (13.5%) | 11 (11.5%) | 951 (13.6%) |
| ≥ 2 years tertiary | 78 (38.2%) | 3,958 (57.4%) | 34 (35.4%) | 4,002 (57.2%) |
| **educational attainment father**  ≤ 9 years | 13 (8.7%) | 311 (4.9%) | 8 (11.3%) | 316 (4.9%) |
| 10-12 years | 78 (52.3%) | 2,728 (43.0%) | 27 (38.0%) | 2,779 (43.3%) |
| < 2 years tertiary | 19 (12.8%) | 663 (10.4%) | 6 (8.5%) | 676 (10.5%) |
| ≥ 2 years tertiary | 39 (26.2%) | 2,643 (41.7%) | 30 (42.3%) | 2,652 (41.2%) |
| **Smoking mother**  No smoking  cigars/pipe  < 10 cigarettes  > 10 cigarettes  Do not know  Always outside | NA | NA | NA | NA |
| **Smoking father**  No smoking  cigars/pipe  < 10 cigarettes  > 10 cigarettes  Do not know  Always outside | NA | NA | NA | NA |

Categorical characteristics are denoted as frequencies (proportions). Continuous characteristics are denoted as median (inter quartile range). NA: data not available.

**Supplementary figure S1. The directed acyclic graph of the association between ADHD/ASD and antibiotics use.**

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