**Supplementary Table 3:** Associations between exposure to ambient air pollutants and attention deficit hyperactivity disorder (ADHD)

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| --- | --- | --- | --- | --- | --- | --- |
| **Author, year** | **Pollutant (s)** | **Exposure window** | **┼Key association** | **Exposure measurement** | **Effect estimates** | **Overall study quality** |
| Chang, 2022 (59) | PM2.5 | Gestation through Childhood | **+** | Daily PM2.5 concentrations were derived from a 1-km satellite-based estimation model average PM2.5 concentration | 10 ug/m3 increase in PM2.5 during the first trimester (HR = 1.26; 95% CI: 1.13-1.40).  10 ug/m3 increase in PM2.5 from the first to third years of life (HR: 1.40-1.87)  When stratified by sex, stronger effect for boys (HR = 1.33; 95% CI: 1.17-1.51, and HR = 1.87; 95% CI: 1.48-2.37 for exposure at the first trimester and the third year of life, respectively) than in girls (HR =1.08, 95% CI: 0.88-1.32, and HR = 1.85; 95% CI: 1.24-2.7) | \*\*\* |
| 1st Trimester | **+** |
| 2nd Trimester | **-** |
| 3rd Trimester | **-** |
| 1-3 Year of Life | **+** |
| Forns, 2016 (32) | NO2 | Childhood | **-** | Weekly averaged NO2 concentrations were measured using Gradko Environmental passive dosimeters. Annual outdoor school levels were obtained by averaging the results | Outdoor NO2 was not statistically associated with ADHD symptomatology | \* |
| Forns, 2018 (18) | PM2.5 | Gestation | **-** | Annual average air pollution concentrations at each participant’s home address at birth were estimated for the whole pregnancy period by land-use regression models | OR for ADHD symptoms was 0.98, 95% CI = 0.80, 1.19 per 5 µg/m3 increase in PM2.5 and 0.95, 95% CI = 0.89, 1.01 per 10 µg/m3 increase in NO2 | \*\* |
| NO2 | Gestation | **-** |
| Fuertes, 2016 (57) | PM2.5 | Childhood | **+** | Long-term (annual average) concentrations of NO2, PM2.5 mass were estimated to each participant's home address at birth, 10 years and 15 years using land-use regression (LUR) models originally derived as part of the “European Study of Cohorts for Air Pollution Effects” | For ADHD: significant associations with PM2.5 mass estimated to the 10- and 15-year addresses (1.12 [95% CI: 1.01, 1.23] and 1.11 [95% CI: 1.01, 1.22]). No significant association with NO2 exposures across birth, 10 years, and 15 years addresses | \*\*\* |
| NO2 | Childhood | **-** |
| Gong, 2014 (89) | NOx | Gestation through Childhood | **-** | Relevant residential addresses of the study subjects were geocoded, and NOx levels were estimated at these coordinates from the dispersion models to calculate annual average concentrations for NOx | Exposure to NOx during the first year of life was not associated ADHD (OR:1.06, 95% CI: 0.71-1.59) Similar results for exposures during each trimester of pregnancy and at 9 years of age | \*\*\* |
| 1st Trimester | **-** |
| 2nd Trimester | **-** |
| 3rd Trimester | **-** |
| 1st year of life | **-** |
| 9th year of life | **-** |
| Markevych, 2018 (27) | NO2 | Childhood | **+** | Annual average NO2 concentrations derived by land use regression modelling and population-weighted mean values of nitrogen dioxide (NO2) were calculated for 186 postal code areas | Increase in NO2 levels by 10 μg/m3 raised the relative risk of ADHD by a factor of (RR=1.32, 95% CI: 1.1-1.58) | \*\* |
| Min, 2017 (61) | NO2 | Gestation | **+** | Data on NO2 was obtained from the National Ambient air Monitoring System (NAMIS) from January 2002 to December 2012 and cumulative exposure levels of NO2 from birth to diagnosis of ADHD (or to the end of study) using annual mean values were calculated | With an increase in 1 ug/m3 of NO2, the HRs for ADHD 1.03 (95% CI: 1.02-1.04).  Infants in the highest NO2 tertile (Tertile3) had an HR of 2.16 (95% CI: 1.61-2.90) for ADHD as compared with the reference group (p < 0.0001) | \*\*\* |
| Oudin, 2019 (54) | NOx | Gestation | **-** | The modelled concentration of (NOx) linked to the geocoded residential address of mothers. Trimester-specific exposure quartiles as well as average exposure levels during the full pregnancy were then calculated | For ADHD, ORs increased to 1 but were not significant | \*\*\* |
| Park, 2020 (55) | NO2 | Childhood (short-term) | **+** | The region-specific daily concentrations of NO2 were estimated from 24-h monitoring data from 318 government operated monitoring site with estimated daily mean concentrations of air pollutants in each monitoring site | An IQR increase in NO2 levels was associated with higher risk of ADHD-related hospital admissions for lag 1, 2, 3, and 4 in the single-day lag models (largest association for lag 3, RR = 1.47, 95% CI: 1.25, 1.73). When stratified by age, the associations were stronger among adolescents aged 15-19 years than those aged 10- 14 years for NO2 (RR = 1.36, 95% CI: 1.19, 1.57 among those aged 10-14 years and RR = 1.70, 95% CI: 1.33, 2.18 among those aged 15-19 years) | \*\*\* |
| Roberts, 2019 (56) | PM2.5 | Childhood | **-** | Annual average pollution exposure estimates were based on the latitude-longitude coordinates of the twins’ residential addresses in 2007, when the twins were aged 12 years, and derived at a 20 m × 20 m resolution from the KCL urban model | No significant associations between both PM2.5 and NO2 exposure at age 12 and symptoms of, ADHD | \*\*\* |
| NO2 | Childhood | **-** |
| Shih, 2020 (30) | NOx | Gestation | **+** | Exposure to air pollutants during gestation was estimated through ordinary kriging based on data from air monitoring stations of Environmental Protection Administration, Taiwan. Every participant's home address was geocoded to the township level and linked it to the mean exposure concentration to determine their personal exposure | gestational exposure to NOx (OR=1.28, 1.08-1.52) during pregnancy was found to be associated with ADHD. Among NOx or NO2, NOx was the significant factor for hyperactivity (adjusted OR per 3.14 ppb: 1.26, 95% CI: 1.09-1.46). | \*\* |
| NO2 | Gestation | **-** |
| Thygesen, 2020 (58) | PM2.5 | Childhood | **+** | Daily concentrations of NO2 and PM2.5 to estimate exposure to ambient air pollution using THOR modeling system which covers the years 1979–2015. The residential address daily concentrations of NO2 and PM2.5 by geographical coordinates, and the average exposure estimated between birth and the fifth birthday, accounting for residential changes | The aIRR (adjusted incidence relative risk) for ADHD 1.38 (1.35 to 1.42) per 10 ug/m3 increase in NO2 and 1.51 (1.41 to 1.62) per 5 ug/m3 increase in PM2.  RR for ADHD for exposure to the highest quintile of NO2 1.70- (1.61 to 1.78) and for highest quintile of PM2.5 1.63-fold (1.52 to 1.76) | \*\*\* |
| NO2 | Childhood | **+** |
| Yuchi, 2022 (60) | PM2.5 | Childhood | **+** | National land use regression (LUR) models provided by CANUE (Canadian Urban Environmental Health Research Consortium, canue. ca) to estimate exposures to PM2.5 and nitrogen dioxide NO2 | For every 2.1 µg/m3 increase in PM2.5, there was an 11% increase in the risk of ADHD (HR: 1.11, 95% CI: 1.06, 1.17). After adjustment for green space, the adverse association was reduced but remained significant, from 1.11 (95% CI: 1.06, 1.17) to 1.03 (95% CI: 0.94, 1.12). No statistically significant associations were found between NO2 and ADHD incidence. In sex stratified analysis PM2.5 was associated with higher risk of ADHD among males (HR: 1.14, 95% CI: 1.08, 1.21) compared to females (HR: 1.03, 95% CI: 0.94, 1.13) | \*\*\* |
| NO2 | Childhood | **-** |

**┼**: [**+**] Statistically significant, [**-**] Statistically Non – significant