Some references on EDCs, corticosteroids, and neurodevelopment

Table of contents

1 EDCs and neurodevelopment **2**
- 1.1 Bouchard et al. (2010) . . . 2
- 1.2 Cartier et al. (2016) . . . 2
- 1.3 Furlong et al. (2017) . . . 2
- 1.4 @ . . . 3
- 1.5 González-Alzaga et al. (2015) . . . 3
- 1.6 H.-B. Huang et al. (2015) . . . 4
- 1.7 P.-C. Huang et al. (2017) . . . 4
- 1.8 Kim et al. (2017) . . . 4
- 1.9 Li et al. (2018) . . . 5
- 1.10 @ . . . 5
- 1.11 Rodríguez-Carrillo et al. (2019) . . . 5
- 1.12 Shoaff et al. (2020) . . . 6
- 1.13 Tewar et al. (2016) . . . 6
- 1.14 @ . . . 7
- 1.15 Yu et al. (2016) . . . 7

2 EDCs and glucocorticosteroids **8**
- 2.1 @ . . . 8
- 2.2 Sears et al. (2023) . . . 8
- 2.3 @ . . . 8

3 Glucocorticosteroids and neurodevelopment **9**

References **9**

1 EDCs and neurodevelopment

1.1 Bouchard et al. (2010)

- Title: *Attention-Deficit/Hyperactivity Disorder and Urinary Metabolites of Organophosphate Pesticides.*
- Exposures: dialkylphosphate metabolites (biomarkers of organophosphate pesticide exposure).
- Medium exposure assessment: spot urine samples.
- Timing exposure assessment: ages 8-15.
- Outcomes: ADHD diagnostic status.
- Timing outcome assessment: ages 8-15.
- Results:
  - Exposure to OP pesticides might contribute to ADHD.
- Sex-specific results: NA.

1.2 Cartier et al. (2016)

- Title: *Organophosphate Insecticide Metabolites in Prenatal and Childhood Urine Samples and Intelligence Scores at 6 Years of Age: Results from the Mother–Child PELAGIE Cohort.*
- Exposures: dialkylphosphate metabolites (biomarkers of organophosphate pesticide exposure).
- Medium exposure assessment: spot urine samples.
- Timing exposure assessment: age 6.
- Outcomes: Wechsler Intelligence Scale for Children.
- Timing outcome assessment: age 6.
- Results:
  - No association between total DAP metabolites and WISC scores.
  - WISC working memory score inversely associated with levels of DE metabolites.
- Sex-specific results: NA.

1.3 Furlong et al. (2017)

- Title: *Prenatal exposure to organophosphorus pesticides and childhood neurodevelopmental phenotypes.*
- Exposures: organophosphorus pesticides. Total diethylphosphate and total dimethylphosphate.
- Medium exposure assessment: spot urine samples.

- Timing exposure assessment: prenatal between 25 and 40 weeks of gestation.
- Outcomes: behavior, executive functioning, and IQ.
- Timing outcome assessment: ages 6–9.
- Results:
  - Dimethylphosphate metabolites negatively associated with Internalizing factor scores.
  - Dimethylphosphate metabolites positively associated with Executive Functioning factor scores.
  - Diethylphosphate metabolites negatively associated with Working Memory Index.
- Sex-specific results: no interactions by sex.

1.4 @

- Title: **.
- Exposures: .
- Medium exposure assessment: .
- Timing exposure assessment: .
- Outcomes: .
- Medium outcome assessment: .
- Timing outcome assessment: .
- Results:
  - .
- Sex-specific results: .

1.5 González-Alzaga et al. (2015)

- Title: *Pre- and postnatal exposures to pesticides and neurodevelopmental effects in children living in agricultural communities from South-Eastern Spain.*
- Exposures: dialkylphosphate metabolites (biomarkers of organophosphate pesticide exposure).
- Medium exposure assessment: urine samples.
- Timing exposure assessment: ages 6-11.
- Outcomes: Wechsler Intelligence Scale for Children.
- Timing outcome assessment: ages 6-11.
- Results:
  - DAP levels inversely associated with performance on intelligence quotient and verbal comprehension domain.
- Sex-specific results: stronger associations in males.

1.6 H.-B. Huang et al. (2015)

- Title: *Association of Exposure to Endocrine-Disrupting Chemicals During Adolescence With Attention-Deficit/Hyperactivity Disorder–Related Behaviors.*
- Exposures: seven metabolite of phthalate esters.
- Medium exposure assessment: urine samples.
- Timing exposure assessment: prenatal and at ages 2, 5, 8, and 11.
- Outcomes: Bayley and Wechsler tests for assessing neurocognitive functions and intelligence (IQ).
- Timing outcome assessment: ages 2, 5, 8, and 11.
- Results:
  - Children's phthalate exposure (MEOHP and sum of DEHP metabolites) inversely associated with cognitive development.
- Sex-specific results: NA.

1.7 P.-C. Huang et al. (2017)

- Title: *Intellectual evaluation of children exposed to phthalate-tainted products after the 2011 Taiwan phthalate episode.*
- Exposures: 5 phthalate metabolites.
- Medium exposure assessment: first-morning urine samples.
- Timing exposure assessment: ages 3-12.
- Outcomes: Wechsler tests for assessing the children's intelligence quotient.
- Timing outcome assessment: ages 3-12.
- Results:
  - MEOHP, MnBP, and MiBP inversely associated with verbal intelligence.
- Sex-specific results: NA.

1.8 Kim et al. (2017)

- Title: *The effects of maternal and children phthalate exposure on the neurocognitive function of 6-year-old children.*
- Exposures: phthalate metabolites.
- Medium exposure assessment: urine samples.
- Timing exposure assessment: age 6
- Outcomes: IQ scores and continuous performance test variables.
- Timing outcome assessment: age 6.
- Results:

  - DEHP metabolites (including MEHHP and MEOHP) inversely associated with intelligence, attention, and response time variability.

- Sex-specific results: NA.

1.9 Li et al. (2018)

- Title: *Relationship between bisphenol A exposure and attention-deficit/ hyperactivity disorder: A case-control study for primary school children in Guangzhou, China.*
- Exposures: bisphenol-A.
- Medium exposure assessment: spot urine samples.
- Timing exposure assessment: ages 6-12.
- Outcomes: ADHD.
- Timing outcome assessment: ages 6-12.
- Results:
  - Positive association between BPA levels and odds of ADHD.
- Sex-specific results: stronger associations in males.

1.10 @

- Title: **.
- Exposures: .
- Medium exposure assessment: .
- Timing exposure assessment: .
- Outcomes: .
- Medium outcome assessment: .
- Timing outcome assessment: .
- Results:
  - .
- Sex-specific results: .

1.11 Rodríguez-Carrillo et al. (2019)

- Title: *Bisphenol A and cognitive function in school-age boys: Is BPA predominantly related to behavior?.*
- Exposures: bisphenol-A.
- Medium exposure assessment: spot urine samples.
- Timing exposure assessment: ages 9-11.
- Outcomes: comprehensive neuropsychological test battery.

- Timing outcome assessment: ages 9-11.
- Results:
  - No consistent association between BPA levels and cognitive abilities.
  - Possible inverse association between BPA levels and working memory.
- Sex-specific results: assessment only in males.

1.12 Shoaff et al. (2020)

- Title: *Association of Exposure to Endocrine-Disrupting Chemicals During Adolescence With Attention-Deficit/Hyperactivity Disorder–Related Behaviors.*
- Exposures: phthalates, parabens, phenols, and triclocarban.
- Medium exposure assessment: urine samples.
- Timing exposure assessment: age 15.3
- Outcomes: Conners Attention Deficit Scale and the Behavior Assessment System for Children.
- Timing outcome assessment: age 15.3
- Results:
  - Exposure to antiandrogenic phthalates increases the risk of ADHD-related behavior problems.
- Sex-specific results: stronger associations in males.

1.13 Tewar et al. (2016)

- Title: *Association of Bisphenol A exposure and Attention-Deficit/Hyperactivity Disorder in a national sample of U.S. children.*
- Exposures: bisphenol-A.
- Medium exposure assessment: spot urine samples.
- Timing exposure assessment: ages 8-15.
- Outcomes: presence of ADHD in the past year.
- Timing outcome assessment: ages 8-15.
- Results:
  - Positive association between BPA levels and ADHD.
- Sex-specific results: stronger associations in males.

1.14 @

- Title: **.
- Exposures: .
- Medium exposure assessment: .
- Timing exposure assessment: .
- Outcomes: .
- Medium outcome assessment: .
- Timing outcome assessment: .
- Results:
  - .
- Sex-specific results: .

1.15 Yu et al. (2016)

- Title: *Increased risk of attention-deficit/hyperactivity disorder associated with exposure to organophosphate pesticide in Taiwanese children.*
- Exposures: dialkylphosphate metabolites (biomarkers of organophosphate pesticide exposure).
- Medium exposure assessment: urine samples.
- Timing exposure assessment: ages 4-15.
- Outcomes: ADHD.
- Timing outcome assessment: ages 4-15.
- Results:
  - Dose–response relationship between urinary concentrations of dimethylphosphate and ADHD.
- Sex-specific results: NA.

TODO:

- Gascon et al. 2015
- Oh et al. 2023
- Vilmand et al. 2023

---

2 EDCs and glucocorticosteroids

2.1 @

- Title: **.
- Exposures: .
- Medium exposure assessment: .
- Timing exposure assessment: .
- Outcomes: .
- Medium outcome assessment: .
- Timing outcome assessment: .
- Results:
  - .
- Sex-specific results: .

2.2 Sears et al. (2023)

- Title: *Evaluating mixtures of urinary phthalate metabolites and serum per-/polyfluoroalkyl substances in relation to adolescent hair cortisol: The HOME Study.*
- Exposures: phthalate metabolites.
- Medium exposure assessment: spot urine samples.
- Timing exposure assessment: ages 1-5 and 8.
- Outcomes: cortisol.
- Medium outcome assessment: hair.
- Timing outcome assessment: age 12.
- Results:
  - Positive association between mixture of phthalates metabolites measured in childhood and hair cortisol measured in adolescence. Driven by MEP, MiBP, MBzP.
- Sex-specific results: no evidence of modification by sex.

2.3 @

- Title: **.
- Exposures: .
- Medium exposure assessment: .
- Timing exposure assessment: .
- Outcomes: .
- Medium outcome assessment: .

- Timing outcome assessment: .
- Results:
  - .
- Sex-specific results: .

TODO:

- Kim et al. 2018
- Sun et al. 2018

---

3 Glucocorticosteroids and neurodevelopment

References

Bouchard, Maryse F., David C. Bellinger, Robert O. Wright, and Marc G. Weisskopf. 2010. "Attention-Deficit/Hyperactivity Disorder and Urinary Metabolites of Organophosphate Pesticides." *Pediatrics* 125 (6): e1270–77. https://doi.org/10.1542/peds.2009-3058.

Cartier, Chloé, Charline Warembourg, Gaïd Le Maner-Idrissi, Agnès Lacroix, Florence Rouget, Christine Monfort, Gwendolina Limon, et al. 2016. "Organophosphate Insecticide Metabolites in Prenatal and Childhood Urine Samples and Intelligence Scores at 6 Years of Age: Results from the Mother–Child PELAGIE Cohort (France)." *Environmental Health Perspectives* 124 (5): 674–80. https://doi.org/10.1289/ehp.1409472.

Furlong, Melissa A., Amy Herring, Jessie P. Buckley, Barbara D. Goldman, Julie L. Daniels, Lawrence S. Engel, Mary S. Wolff, et al. 2017. "Prenatal Exposure to Organophosphorus Pesticides and Childhood Neurodevelopmental Phenotypes." *Environmental Research* 158 (October): 737–47. https://doi.org/10.1016/j.envres.2017.07.023.

González-Alzaga, Beatriz, Antonio F. Hernández, Miguel Rodríguez-Barranco, Inmaculada Gómez, Clemente Aguilar-Garduño, Inmaculada López-Flores, Tesifón Parrón, and Marina Lacasaña. 2015. "Pre- and Postnatal Exposures to Pesticides and Neurodevelopmental Effects in Children Living in Agricultural Communities from South-Eastern Spain." *Environment International* 85 (December): 229–37. https://doi.org/10.1016/j.envint.2015.09.019.

Huang, Han-Bin, Hsin-Yi Chen, Pen-Hua Su, Po-Chin Huang, Chien-Wen Sun, Chien-Jen Wang, Hsiao-Yen Chen, Chao A. Hsiung, and Shu-Li Wang. 2015. "Fetal and Childhood Exposure to Phthalate Diesters and Cognitive Function in Children Up to 12 Years of Age: Taiwanese Maternal and Infant Cohort Study." *PLOS ONE* 10 (6): e0131910. https://doi.org/10.1371/journal.pone.0131910.

Huang, Po-Chin, Chih-Hsin Tsai, Chu-Chih Chen, Ming-Tsang Wu, Mei-Lien Chen, Shu-Li Wang, Bai-Hsiun Chen, et al. 2017. "Intellectual Evaluation of Children Exposed to Phthalate-Tainted Products After the 2011 Taiwan Phthalate Episode." *Environmental Research* 156 (July): 158–66. https://doi.org/10.1016/j.envres.2017.03.016.

Kim, Johanna Inhyang, Yun-Chul Hong, Choong Ho Shin, Young Ah Lee, Youn-Hee Lim, and Bung-Nyun Kim. 2017. "The Effects of Maternal and Children Phthalate Exposure on the Neurocognitive Function of 6-Year-Old Children." *Environmental Research* 156 (July): 519–25. https://doi.org/10.1016/j.envres.2017.04.003.

Li, Yanru, Haibin Zhang, Hongxuan Kuang, Ruifang Fan, Caihui Cha, Guanyong Li, Zhiwei Luo, and Qihua Pang. 2018. "Relationship Between Bisphenol A Exposure and Attention-Deficit/ Hyperactivity Disorder: A Case-Control Study for Primary School Children in Guangzhou, China." *Environmental Pollution* 235 (April): 141–49. https://doi.org/10.1016/j.envpol.2017.12.056.

Rodríguez-Carrillo, Andrea, Vicente Mustieles, Rocío Pérez-Lobato, José M. Molina-Molina, Iris Reina-Pérez, Fernando Vela-Soria, Soledad Rubio, Nicolás Olea, and Mariana F. Fernández. 2019. "Bisphenol A and Cognitive Function in School-Age Boys: Is BPA Predominantly Related to Behavior?" *NeuroToxicology* 74 (September): 162–71. https://doi.org/10.1016/j.neuro.2019.06.006.

Sears, Clara G, Yun Liu, Bruce P Lanphear, Jessie P Buckley, Jerrold Meyer, Yingying Xu, Aimin Chen, Kimberly Yolton, and Joseph M Braun. 2023. "Evaluating Mixtures of Urinary Phthalate Metabolites and Serum Per-/Polyfluoroalkyl Substances in Relation to Adolescent Hair Cortisol: The HOME Study." *American Journal of Epidemiology*, October, kwad198. https://doi.org/10.1093/aje/kwad198.

Shoaff, Jessica R., Brent Coull, Jennifer Weuve, David C. Bellinger, Antonia M. Calafat, Susan L. Schantz, and Susan A. Korrick. 2020. "Association of Exposure to Endocrine-Disrupting Chemicals During Adolescence With Attention-Deficit/Hyperactivity Disorder–Related Behaviors." *JAMA Network Open* 3 (8): e2015041. https://doi.org/10.1001/jamanetworkopen.2020.15041.

Tewar, Shruti, Peggy Auinger, Joseph M. Braun, Bruce Lanphear, Kimberly Yolton, Jeffery N. Epstein, Shelley Ehrlich, and Tanya E. Froehlich. 2016. "Association of Bisphenol A Exposure and Attention-Deficit/Hyperactivity Disorder in a National Sample of U.S. Children." *Environmental Research* 150 (October): 112–18. https://doi.org/10.1016/j.envres.2016.05.040.

Yu, C.-J., J.-C. Du, H.-C. Chiou, M.-Y. Chung, W. Yang, Y.-S. Chen, M.-R. Fuh, L.-C. Chien, B. Hwang, and M.-L. Chen. 2016. "Increased Risk of Attention-Deficit/Hyperactivity Disorder Associated with Exposure to Organophosphate Pesticide in Taiwanese Children." *Andrology* 4 (4): 695–705. https://doi.org/10.1111/andr.12183.