

# Flame retardants and pesticides overtake heavy metals as biggest contributors to IQ loss

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Adverse outcomes from childhood exposures to lead and mercury are on the decline in the United States, likely due to decades of restrictions on

the use of heavy metals, a new study finds.

Despite decreasing levels, exposure to these and other toxic chemicals, especially flame retardants and pesticides, still resulted in more than a million cases of intellectual disability in the United States between 2001 and 2016. Furthermore, as the target of significantly fewer restrictions, experts say, flame retardants and pesticides now represent the bulk of that cognitive loss.

NYU Grossman School of Medicine researchers found that IQ loss from the [toxic chemicals](#) analyzed in their study dropped from 27 million IQ points in 2001 and 2002 to 9 million IQ points in 2015 and 2016.

While this overall decline is promising, the researchers say, their findings also identify a concerning shift in which chemicals represent the greatest risk. Among toxin-exposed children, the researchers found that the proportion of cognitive loss that results from exposure to chemicals used in flame retardants, called polybrominated diphenyl ethers (PDBEs), and organophosphate pesticides increased from 67 percent to 81 percent during the same study period.

"Our findings suggest that our efforts to reduce exposure to heavy metals are paying off, but that toxic exposures in general continue to represent a formidable risk to Americans' physical, mental, and [economic health](#)," says lead study investigator Abigail Gaylord, MPH, a doctoral candidate in the Department of Population Health at NYU Langone.

"Unfortunately, the minimal policies in place to eliminate pesticides and flame retardants are clearly not enough."

The substances analyzed are found in household products from furniture upholstery to tuna fish, and can build up in the body to damage organs, researchers say. Heavy metals, lead and mercury in particular, are known to disrupt brain and kidney function. In addition, they, along with [flame](#)

[retardants](#) and pesticides, can interfere with the thyroid, which secretes brain-developing hormones. Experts say exposure at a young age to any of these toxins can cause learning disabilities, autism, and behavioral issues.

In their investigation, the researchers found that everyday contact with these substances during the 16-year study period resulted in roughly 1,190,230 children affected with some form of intellectual disability. Overall childhood exposures cost the nation \$7.5 trillion in lost economic productivity and other societal costs.

"Although people argue against costly regulations, unrestricted use of these chemicals is far more expensive in the long run, with American children bearing the largest burden," says senior study author Leonardo Trasande, MD, MPP, the Jim G. Hendrick, MD Professor at NYU Langone Health.

Publishing online Jan. 14 in the journal *Molecular and Cellular Endocrinology*, the new study is the only long-term neurological and economic investigation of its kind, the authors say. The investigators analyzed PBDE, organophosphate, lead, and methylmercury exposures in blood samples from women of childbearing age and 5-year-olds. Data on women and children was obtained from the National Health and Nutrition Examination Survey.

The researchers used results from several previous environmental health studies to estimate the annual number of IQ points lost per unit of exposure to each of the four main chemicals in the study. Then, they estimated the lost productivity and medical costs over the course of the children's lives linked to long-term intellectual disability using a second algorithm, which valued each lost IQ point at \$22,268 and each case of intellectual disability at \$1,272,470.

While exposure to these chemicals persists despite tightened regulations, experts say Americans can help limit some of the effects by avoiding the use of [household products](#) or foods that contain them.

"Frequently opening windows to let persistent chemicals found in furniture, electronics, and carpeting escape, and eating certified organic produce can reduce exposure to these toxins," says Trasande, who also serves as chief of environmental pediatrics in the Department of Pediatrics at NYU Langone.

Trasande notes that the impact of these chemicals may be worse than their study can capture since there are far more hazards that affect brain development than the four highlighted in the investigation, and other potential consequences beyond IQ loss. "All the more reason we need closer federal monitoring of these substances," she says.

The study authors say they plan to explore the cost of exposure to endocrine-disrupting chemicals in other countries.

Provided by New York University

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