

Lead exposure in last century shrunk IQ scores of half of Americans

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In 1923, lead was first added to gasoline to help keep car engines healthy. However, automotive health came at the great expense of our own well-being.

A new study calculates that exposure to car exhaust from leaded gas during childhood stole a collective 824 million IQ points from more than 170 million Americans alive today, about half the population of the United States.

The findings, from Aaron Reuben, a Ph.D. candidate in clinical psychology at Duke University, and colleagues at Florida State University, suggest that Americans born before 1996 may now be at greater risk for lead-related health problems, such as faster aging of the brain. Leaded gas for cars was banned in the U.S. in 1996, but the researchers say that anyone born before the end of that era, and especially those at the peak of its use in the 1960s and 1970s, had concerning high lead exposures as children.

The team's paper appeared the week of March 7 in the journal *Proceedings of the National Academy of Sciences*.

Lead is neurotoxic and can erode [brain cells](#) after it enters the body. As such, there is no safe level of exposure at any point in life, health experts say. Young children are especially vulnerable to lead's ability to impair [brain development](#) and lower cognitive ability. Unfortunately, no matter what age, our brains are ill-equipped for keeping it at bay.

"Lead is able to reach the bloodstream once it's inhaled as dust, or ingested, or consumed in water," Reuben said. "In the bloodstream, it's able to pass into the brain through the [blood-brain barrier](#), which is quite good at keeping a lot of toxicants and pathogens out of the brain, but not all of them."

One major way lead used to invade bloodstreams was through automotive exhaust.

To answer the complex question of how leaded gas use for more than 70

years may have left a permanent mark on human health, Reuben and his co-authors Michael McFarland and Mathew Hauer, both professors of sociology at Florida State University, opted for a fairly simple strategy.

Using publicly available data on U.S. childhood blood-lead levels, leaded-gas use, and population statistics, they determined the likely lifelong burden of lead exposure carried by every American alive in 2015. From this data, they estimated lead's assault on our intelligence by calculating IQ points lost from leaded gas exposure as a proxy for its harmful impact on public health.

The researchers were stunned by the results.

"I frankly was shocked," McFarland said. "And when I look at the numbers, I'm still shocked even though I'm prepared for it."

As of 2015, more than 170 million Americans (more than half of the U.S. population) had clinically concerning levels of lead in their blood when they were children, likely resulting in lower IQs and putting them at higher risk for other long-term health impairments, such as reduced brain size, greater likelihood of mental illness, and increased cardiovascular disease in adulthood.

Leaded gasoline consumption rose rapidly in the early 1960s and peaked in the 1970s. As a result, Reuben and his colleagues found that essentially everyone born during those two decades are all but guaranteed to have been exposed to pernicious levels of lead from car exhaust.

Even more startling was lead's toll on intelligence: childhood lead exposure may have blunted America's cumulative IQ score by an estimated 824 million points—nearly three points per person on average. The researchers calculated that at its worst, people born in the mid-to-late 1960s may have lost up to six IQ points, and children registering the

highest levels of lead in their blood, eight times the current minimum level to initiate clinical concern, fared even worse, potentially losing more than seven IQ points on average.

Dropping a few IQ points may seem negligible, but the authors note that these changes are dramatic enough to potentially shift people with below-average cognitive ability (IQ score less than 85) to being classified as having an intellectual disability (IQ score below 70).

Moving forward, McFarland is analyzing the racial disparities of childhood lead exposure, hoping to highlight the health inequities suffered by Black children, who were exposed more often to lead and in greater quantities than white children.

Reuben's next step will be to examine the long-term consequences of past lead exposure on brain health in old age, based on [previous findings](#) that adults with high childhood lead exposure may experience accelerated [brain](#) aging.

"Millions of us are walking around with a history of lead exposure," Reuben said. "It's not like you got into a car accident and had a rotator cuff tear that heals and then you're fine. It appears to be an insult carried in the body in different ways that we're still trying to understand but that can have implications for life."

More information: Half of US population exposed to adverse lead levels in early childhood, *Proceedings of the National Academy of Sciences* (2022). [DOI: 10.1073/pnas.2118631119](https://doi.org/10.1073/pnas.2118631119).

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