

# Does Fluoride Lower IQ Scores?

America has been preventing tooth decay with fluoridated water for over 75 years. Community water fluoridation is effective, safe and benefits *everyone* regardless of age or income. About 75% of U.S. communities enjoy fluoridated water.

Until recently, concerns about fluoride and IQ were rarely raised. Studies from [New Zealand](#) and [Sweden](#) found that the IQ scores of adolescents and adults who lived in fluoridated communities during infancy and childhood were *no different* than the scores of people who lived in communities without fluoridated water. These two studies are unique because they followed participants and tracked IQs and other possible effects over time, well into adulthood.

Opponents of fluoridation began focusing on IQ after the 2012 publication of a [systematic review](#) of 27 studies. Opponents claimed that this review showed that lower IQ scores in children were “caused” by fluoride. There are many reasons why the evidence does not support this claim.

- This research review did not test cause and effect. The authors examined a variety of dissimilar studies from China, Mongolia and Iran and reported what was observed. None of these studies followed children into adulthood.
- The authors warned that the studies they reviewed “had deficiencies, in some cases rather serious, which limit the conclusions that can be drawn.” They cautioned that further research would be needed to rule out other factors affecting test scores, such as nutrition, the quality of schools, and the presence of contaminants such as lead.
- The studies do not describe the water that American children drink. The fluoride in these countries was in some cases more than 5 times higher than the level used for water fluoridation in the United States.
- The authors did not consider the possibility of reverse causality — meaning that parents of above-average IQ and financial means, who could create home conditions that favor higher IQ, may have relocated from communities with high fluoride levels before having children. Likewise, families may have departed areas with fluoride levels that markedly exceed the [World Health Organization](#)'s standards to avoid dental and skeletal fluorosis that can occur in those places. As a result, the average IQ in those communities could appear to be lower simply because these families were absent, not because of any neurological effects of the fluoride.

## The research focus shifts

In the past several years, opponents have focused on prenatal exposure to fluoride, with studies from [Mexico City](#) and [Canada](#), where fluoride exposure is similar to what is experienced in U.S. and Canadian communities. These studies reported some differences in the IQ scores of 3- and 4-year-olds related to the level of fluoride their mothers were exposed to. However, the Canadian study only showed a significant difference for boys — and only on one of the two tests.

Many issues have been raised about the quality of the studies from Mexico City and Canada and, importantly, the results have not been confirmed by other research teams.

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For example, since fetal fluoride exposure cannot be measured directly, these studies used spot samples of mothers' urinary fluoride (MUF) levels to estimate the fluoride that might reach the fetus (via the placenta and the mother's blood). However, research suggests that spot MUF is [not associated](#) with plasma fluoride which means that a spot urine sample cannot yield a valid measure of fetal fluoride exposure.

Any attempt to study IQ differences must take into account the many factors that can affect intelligence scores. Some of these include breastfeeding, nutrition, and mothers' IQ.

Researchers attempt to account for these factors to raise confidence that they didn't skew or affect the results. The studies from Mexico City and Canada accounted for some but not all these factors.

These two studies relied on IQ testing that was conducted at only one age. By contrast, the New Zealand study tested IQ several times, starting at age 7 and ending at age 38. The fact that multiple test scores were collected over a long period time (31 years) means that we can have more confidence in these results over others.

There is a practice in the scientific community of "registering" research trials, studies, or reports. In doing this, researchers explain why they include or exclude various factors before conducting their statistical analysis. Analyses that are registered in advance have a high degree of integrity because they protect against "fishing expeditions" which occur when researchers test any number of conditions until they find an association between A and B.

The studies based on the Canadian data sample (Maternal-Infant Research on Environmental Chemicals (MIREC)) were never registered.

As a result, the Canadian researchers have been able to add, remove, or change the factors they study, allowing them to coax a statistical model until it shows an association. Several studies have been published so far that have been inconsistent in their inclusion or exclusion of important factors. For example, the city where mothers and children lived was excluded. Factors like whether a child was breastfed and post-natal exposure to fluoride have been inconsistently included.

Finally, it is very concerning that, despite multiple requests, no other research team has been given access to the MIREC data that the Canadian researchers analyzed. The [National Institutes of Health encourages data-sharing](#) so that other research teams have an opportunity to see if their reanalysis produces the same results.

### **The National Academies weighs in**

In 2015, the National Toxicology Program (NTP) began a review of studies on fluoride and cognitive effects, including those from Mexico City and Canada, and has since produced several drafts of a report to summarize the findings. As is customary, the NTP sought peer-review of its work, in this instance from the National Academies of Science, Engineering and Medicine. After its reviews, the [National Academies concluded](#) that the NTP had not

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identified “clear and convincing” evidence to support its claim that fluoride causes low IQ and should be assumed to be a neurodevelopmental hazard to humans. Going one step further, the National Academies instructed NTP to clarify that the studies it reviewed do not raise safety concerns about low fluoride exposures, “including those typically associated with drinking-water fluoridation.”

In 2021, [a study from Spain](#) found that mothers' prenatal fluoride exposure was associated with *higher* cognitive scores in boys at age 4, while there was no difference in girls. This contradicts the findings of the 2019 Canadian study. A much larger study in Australia followed boys and girls with different lifetime fluoride exposures from birth to age 5. This study assessed the children's emotional and behavioral development later before they reached age 18. Exposure to fluoridated water during the first five years of life was not associated with altered measures of child emotional and behavioral development and executive functioning.

More than [6,800 studies](#) and research papers have been produced on fluoridation, and the overwhelming evidence shows its safety and benefits as a public health practice. Community water fluoridation has been and continues to be thoroughly evaluated to ensure the health of those who benefit from it.