

# No, Fluoride Doesn't Lower IQ. It Fails to Satisfy Hill's Criteria of Causality



By Alex Berezow, PhD — August 19, 2019



Credit: Claritas/Wikipedia [1]

Because Americans have a conspiracy theory about everything, of course there's a conspiracy involving drinking water. Didn't you know that fluoride, which is added to our drinking water to keep our teeth healthy (and is considered one of the greatest public health triumphs of all time), is actually a nefarious mind control scheme?

Well, the media just handed these conspiracy theorists a gift on a giant silver platter: Multiple outlets are reporting that pregnant women who consume too much fluoride produce children with lower IQs. The reports are based on an extremely controversial [study](#) [2] just published in *JAMA Pediatrics*. Are the study's conclusions true? It's doubtful.

To illustrate why, let's examine the authors' findings in the context of Hill's Criteria of Causality, a series of benchmarks devised by epidemiologist Austin Bradford Hill meant to tease apart correlation from causation. There are nine criteria: (1) Strength of association; (2) Consistency; (3) Specificity; (4) Temporality; (5) Biological gradient (dose-response); (6) Plausibility; (7) Coherence; (8) Experiment; (9) Analogy. (See this [article](#) [3] for explanations of each criterion.)

While it is rarely possible for any claim to meet every single criterion, there shouldn't be any blatant violations. How does the "fluoride causes lower IQ" claim stack up? It violates several of Hill's Criteria:

**Strength of association.** The link between fluoride and IQ is not particularly strong. As Dr. [John Ioannidis](#) [4] (a professional junk debunker who shook the world of biomedical science by showing why most published papers are wrong) told the *Washington Post* [5], "The results are very borderline in terms of statistical significance." Indeed, the reported drop in IQ for boys was about

4.5 points, but the confidence interval (-8.38 to -0.60) almost included zero. (In statistics, if a confidence interval includes zero, it means "nothing to see here.")

**Consistency.** The paper is not consistent with other data on the topic. While it is true that extremely high doses of fluoride harm the brain, people are not exposed to those levels by drinking water. Also, the American Academy of Pediatrics [explains](#) [6] that as water fluoridation has become more widespread over the past several decades, Americans' IQ has increased. (This IQ increase is known as the [Flynn effect](#) [7], which is perhaps due to better nutrition, public health, and education.)

**Coherence.** While the authors conclude that a 1-mg increase in fluoride detected in the mother's urine is linked to an IQ drop of about 4.5 points in boys, there is no statistically significant IQ difference among girls. (Actually, it's worse than that. The point estimate shows an IQ *increase* of 2.4 points for girls.) Obviously, that is incoherent. There is no sensible biochemical reason for why fluoride would harm the brains of boys but not those of girls.

Finally, it's worth pointing out that the 4.5-point lower IQ score among boys is for every 1 mg increase in the mother's urine fluoride levels. But women didn't really have that much of a difference in fluoride levels. The expected difference between the "high fluoride" and "low fluoride" groups was 0.29 mg, which would translate into an IQ drop of 1.3 points. (That is,  $4.5 \times 0.29$ .)

So, are the authors wrong? Probably. To be certain, it wouldn't be a bad idea to do a larger study examining the issue, just in case.

Thankfully, the authors didn't make any grand, sweeping conclusions. They simply advise, "These findings indicate the possible need to reduce fluoride intake during pregnancy." Unfortunately, this sort of nuance will be lost on conspiracy theorists and much of the media.

---

COPYRIGHT © 1978-2016 BY THE AMERICAN COUNCIL ON SCIENCE AND HEALTH

---

**Source URL:** <https://www.acsh.org/news/2019/08/19/no-fluoride-doesnt-lower-iq-it-fails-satisfy-hills-criteria-causality-14229>

#### Links

[1] [https://en.wikipedia.org/wiki/Drinking\\_water#/media/File:A\\_drinking\\_fountain\\_in\\_Saint-Paul-de-Vence.JPG](https://en.wikipedia.org/wiki/Drinking_water#/media/File:A_drinking_fountain_in_Saint-Paul-de-Vence.JPG)

[2] <https://jamanetwork.com/journals/jamapediatrics/fullarticle/2748634>

[3] <https://www.acsh.org/news/2017/10/31/acsh-explains-hills-criteria-determining-causality-correlation-12013>

[4] <https://www.acsh.org/news/2018/08/24/john-ioannidis-aims-his-bazooka-nutrition-science-13357>

[5] <https://www.washingtonpost.com/science/2019/08/19/study-raises-questions-about-fluoride-childrens-iq/>

[6] <https://ilikemyteeth.org/fluoridation/dangers-of-fluoride/fluoride-iqs/>

[7] <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6042097/>