Letter

Health effects of water fluoridation: a response to the letter by Menkes et al
Jonathan M Broadbent, W Murray Thomson, Terrie Moffitt, Richie Poulton

Dear Sir,

The letter from Menkes, Theissen, and Williams raised some interesting questions about our paper on community water fluoridation (CWF) and IQ. Specifically:

- The correspondents suggest that we did not effectively account for location effects (both suburb location and distance from the city centre) when examining the relation between fluoride exposure and IQ. According to the correspondents, “unmeasured confounders” (which they did not specify) may vary by suburb/location and thus explain the findings. To check this possibility, we re-ran our analysis taking into account both suburb and distance from the city centre. This resulted in no meaningful change in terms of significance, effect size, or direction of our original findings.

- The correspondents questioned our assumption of a normal distribution for IQ. We note that IQ (similar to height, for example) is generally regarded as the sine qua non of a normal distribution. We also point out that the assumption for regression analyses is of the normality distribution of the residuals, not that of the raw data. In our original model, the residuals were normally distributed, thus allaying their concern. For the 10 study members who had unstandardised childhood IQs of <70, all had documented histories of compromised intellectual function attributable to early-life CNS dysfunction, rather than extreme exposure to fluoride.

- The correspondents sought more analysis using total fluoride intake. Specifically, they mentioned data on total fluoride exposure from diet, toothpaste, and fluoride tablets. We calculated those and used them, and this resulted in no meaningful change of significance, effect size, or direction in our original finding.

- The correspondents sought more information about the interaction between breastfeeding (including duration) and living in a fluoridated area in relation to subsequent IQ. We modelled this as suggested, and can report no significant breastfeeding-fluoride interaction.

- They also queried the number of people in our sample who had “no” fluoride exposure. We note that there is no such thing as no fluoride exposure; that is, fluoride is naturally present in both soil and water. Nonetheless, we were amply powered to conduct analyses that distinguished between high and low fluoride exposure and to model the relation with IQ, in both childhood and adulthood, after controlling for a number of relevant confounders. Similarly, we had sufficient power to explore differences in experience of dental caries and fluorosis by fluoride exposure.

As we showed in our original report, and subsequent analyses described herein, there was no evidence of a detrimental effect on IQ from fluoride at the levels used in CWF. It is worth pointing out, however, that we have observed significantly fewer caries-affected teeth in both childhood and adulthood among those who resided in CWF areas as children.
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References
