

Reinterpretation of fluoride neurotoxicity study in Swedish adolescents and adults: Evidence of IQ reductions at low water fluoride concentrations

C. Neurath¹

¹ American Environmental Health Studies Project (AEHSP), North Sutton, New Hampshire, United States of America

Aggeborn and Öhman (2021) analyzed the association between drinking water fluoride exposure and cognition-related outcomes in Swedish adolescents and adults, including military conscription aptitude test scores. They estimated lifetime average fluoride concentration using local water treatment plant data. However, 84% of areas lacked treatment plants, requiring extrapolation from other plants within the same municipality—an approach of unknown reliability, as fluoride levels can vary even between nearby plants. The national sample of about 500,000 had an average lifetime exposure of 0.35 mg/L, roughly half the level in artificially fluoridated areas of the United States.

Using linear regression models and sensitivity analyses, the authors concluded fluoride had “zero effect on cognitive ability.” However, several findings contradict this claim. Among 90 models assessing cognition-related outcomes, 84 found adverse associations between fluoride and IQ or achievement. Nine models reached statistical significance, and eight estimated IQ-equivalent reductions exceeding 10 points per 1 mg/L fluoride. Five of the models finding large effects compared brothers with differing fluoride exposure, thereby controlling for shared genetics and family environment.

The study likely suffered substantial non-differential exposure measurement error and bias toward the null. Most areas lacked direct fluoride data, requiring extrapolation. Lifetime average exposure was used rather than early childhood exposure, which may be more relevant to neurodevelopment, potentially diluting effects. The analysis ignored non-water fluoride sources such as diet, tea, and dental products, which could contribute substantially to total exposure given the low average water concentration. Exposure was estimated ecologically rather than individually, despite wide variation in personal water consumption. These multiple sources of measurement error would tend to attenuate associations.

The consistent pattern of adverse findings, sometimes large in magnitude, suggests the study should not be viewed as exonerating fluoride and instead supports evidence linking low-level fluoride exposure to reduced cognitive ability.