Duke UNIVERSITY

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ARTICLE: Association of Childhood Blood Lead Levels With Criminal Offending

A research team led by Amber L. Beckley, Avshalom Caspi, and Terrie E. Moffitt at Duke University reports that there is no clear association between higher childhood blood lead levels and a greater risk for criminal behavior (a dose-response relationship) in settings where blood lead levels are similar across low and high socioeconomic status. These findings are based on a study that followed a birth cohort of 1,000 children, born in one city in New Zealand in the early 1970s and followed to midlife. In 1983, 553 of the children were tested for lead. Because of high lead-in-gasoline levels in New Zealand at the time, childhood lead exposure was widespread and the degree of lead exposure was not related to a child's socioeconomic status in this cohort. Criminal offending was tracked from age 15 years onwards; rates of life-time criminal offending mirror those found in studies from the United States, the United Kingdom, and Scandinavia. The results of this study suggest that responses toward childhood lead exposure should focus on consequences for health rather than consequences for crime.

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FINDINGS:

Past studies have linked childhood lead exposure to criminal behavior later in life. Using a 1972-1973 New Zealand birth cohort where the level of childhood lead exposure was unrelated to socioeconomic status, we tested the association between childhood blood lead levels and criminal behavior from adolescence through middle adulthood**.** We looked at whether our study members were ever (1) convicted of a crime, (2) were repeatedly convicted for crimes (recidivism), (3) convicted of a *violent* crime, or (4) reported criminal behavior on a questionnaire.

We found no clear indication that lead was related to crime.

(1) Childhood lead exposure was not a reliable predictor of criminal conviction (it predicted criminal behavior around the level of random chance).
(2) Greater childhood lead exposure was not associated with repeat convictions (recidivism) of violent offending.
(3) Childhood lead exposure did show a very weak association with participant-reported offending in early adolescence (at age 15 years) but not at later ages.

WHY ARE THESE FINDINGS IMPORTANT?

(1) We have found that childhood lead exposure is not a good predictor of criminal offending throughout life.
(2) Our results suggest that policy responses to community lead exposure events should be focused on the very serious health consequences of lead exposure, rather than a potential crime wave.
(3) Our findings suggest that crime epidemics may not be a direct consequence of childhood lead exposure.

LIMITATIONS:

(1) Our research is based on only one cohort in one part of the world. Although lifetime conviction rates are similar across the world, our findings may not hold for places where, as in the United States, lead exposures are concentrated in disadvantaged communities.
(2) We only had one measure of childhood lead exposure, blood lead levels measured at age 11 years. Other research suggests, however, that our measure provided a reasonable approximation of lifetime lead-exposure in our cohort up to that point.
(3) Average blood lead levels in the Dunedin study were comparable to blood lead levels in other developed countries during the 1980s. But, these levels are high compared to present-day standards. This study's results may not, therefore, be informative about effects of lower blood lead levels seen in present-day children.

SUPPORTING DETAILS:

PARTICIPANTS: Participants were members of the Dunedin Multidisciplinary Health and Development Study, an investigation of the health and behavior of a representative cohort of 1037 consecutive births between April 1972 and March 1973 in Dunedin, New Zealand. This birth cohort's families represented the full range of socioeconomic status in the general population. Follow-ups have been carried out at ages 3, 5, 7, 9, 11, 13, 15, 18, 21, 26, 32, and most recently 38, when 95% of the living cohort members took part.

DOCUMENTARY FILM: We invite you to view a new documentary about the Dunedin Study, called "Predict My Future: The Science of Us," available via Curiosity Stream (https://app.curiositystream.com/video/1268).

MEASURING CHILDHOOD BLOOD-LEAD LEVELS: Our measure of childhood lead exposure was blood-lead level assessed at age 11 years. Approximately 30 ml of venous blood was drawn from each 11-year-old who participated in the assessment carried out at the Research Unit and who freely agreed to give blood.

MEASURING CRIMINAL OFFENDING: Criminal conviction records were obtained through a search of the central computer system of the New Zealand police. A self-reported offending interview was administered at ages 15, 18, 21, 26, 32, and 38 years.

MEASURING SOCIOECONOMIC STATUS: Socioeconomic status scores were assigned to each participant based on their current occupation at age 38 years using the New Zealand Socioeconomic Index (NZSEI-06), which codes occupations based on their associated educationlevel and income in the NZ Census. Participants' childhood socioeconomic status was

defined as the mean of the highest occupational status level of either parent during their childhood, measured using the forerunner of NZSEI. Change in socioeconomic status from childhood to adulthood was calculated by subtracting childhood scores from adult scores where both scores were matched on a six-category scale.

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UNIVERSITIES INVOLVED: Duke University, USA; Stockholm University; U. of Otago, NZ; King's College London, UK.

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