

## Medical News &amp; Perspectives

# Quick Uptakes

## Childhood Lead Exposure May Affect Personality, Mental Health in Adulthood

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**T**he link between childhood lead exposure and long-term cognitive deficits is established, but can such exposure also influence personality and mental health later in life? In this *JAMA Psychiatry* study, researchers tracked hundreds of children for more than 30 years to find out.

### Back Story

Previous observational studies have found an association between prenatal or childhood lead exposure and an increased risk of **schizophrenia** and **antisocial behaviors** in adulthood. But these studies were small, limited to individual psychiatric conditions, and relied on single time-point psychological assessments. As such, researchers have yet to rigorously explore how lead exposure during childhood affects lifelong mental health.

To gain a more thorough understanding, investigators in the United States, the United Kingdom, and New Zealand followed a cohort of 579 children exposed to lead from birth until age 38 years. The children, born between 1972 and 1973 in Dunedin, New Zealand, weren't exposed to lead pipes or paint but to leaded gasoline used in cars from the 1940s through the 1990s. During the 1970s, Dunedin had some of the highest gasoline lead levels in the world. The lead was released in automobile exhaust, contaminating the air and soil. A previous *JAMA* study involving the same children linked higher childhood lead exposure with lower IQ scores and downward social mobility in adulthood.

### What's Unique About This Study?

- It's the longest and largest psychiatric follow-up study involving children tested for lead exposure to date.
- Adult personality was assessed using **5 broad measures**—neuroticism, extraversion, openness to experience, agreeable-

ness, and conscientiousness—without relying on self-report.

- Health professionals evaluated the cohort in clinical interviews every 3 to 6 years beginning at age 18 years for *Diagnostic and Statistical Manual and Mental Disorders*-defined symptoms of 11 mental disorders.
- Based on the interviews, scores for **3 dimensions of psychopathology**—internalizing, externalizing and thought disorders (psychotic experiences)—and general psychopathology (**p-factor**) were correlated with childhood blood lead levels (BLLs).
- The extent of lead exposure among children studied was not dependent on their socioeconomic status, removing a significant confounder.



### What We've Learned

- In 94% of the children, BLLs were above the level for clinical and environmental responses.
- Childhood BLL was significantly associated with higher general psychopathol-

ogy, and internalizing and thought disorder symptoms in adulthood.

- Childhood BLL was significantly associated with lower conscientiousness and agreeableness and higher neuroticism in adulthood.
- Associations between childhood BLL and adult personality and psychopathology remained significant even after adjusting for sex, maternal IQ, socioeconomic status, and family history of mental illness.

### Limitations

The study participants are predominantly white and confined to a specific generation in a particular geographical location, so it's unclear whether these findings may apply to more diverse populations in other countries in the present day. Furthermore, childhood BLLs were measured only once, when the children were 11 years old, which doesn't account for the cumulative effects of lead exposure.

Like all observational studies, the findings only show an association, not a causal relationship, between childhood lead exposure and adult mental health and personality outcomes. And this association was modest—far less than those of other factors such as childhood maltreatment or a family history of mental illness.

"In these types of studies one always has to consider unmeasured confounders, [or] the possibility that lead might be an indicator variable for other substances," said Martin P. Paulus, MD, scientific director and president of the Laureate Institute for Brain Research in Tulsa, Oklahoma. "[O]ne would need to have a better understanding of the pathophysiology and directly show that lead leads to brain changes that [in turn] lead to these psychopathological changes," added Paulus, deputy editor of *JAMA Psychiatry*, who wasn't involved in the study.

### Lead Exposure Takes a Worldwide Toll

- Four million US households with children are [exposed](#) to high lead levels.
- Approximately 500 000 US children aged 1 to 5 years have BLLs higher than 5 µg/dL, the level at which public health action is recommended.
- In 2016, lead exposure [accounted](#) for:
  - 540 000 deaths and 13.9 million years of healthy life lost globally.
  - 63.8% of the global burden of idiopathic developmental intellectual disability.
- No blood concentration of lead is safe; its neurological and behavioral effects are thought to be irreversible.

#### Why Is This Important?

The findings suggest that lead exposure during childhood may have long-lasting consequences for mental health and personality.

Despite the modest effect size of the association, "[i]t's potentially important because [lead exposure] is a modifiable risk factor that at one point in time every-

one was exposed to, and now, certain people in certain cities and countries are still exposed to," Aaron Reuben, study co-author and graduate student in clinical psychology at Duke University, said in a [news release](#).

Policy makers and clinicians should consider the possibility that "the generation of adult patients with a history of childhood lead exposure may benefit from increased screening and access to mental health services," the study authors wrote. ■

**Note:** Source references are available through embedded hyperlinks in the article text online.