Research Summaries: Experiences, Lead and Stress

Based on the published work:

Behavioral Experience Can Alter the Consequence of Developmental Exposure to Lead and Stress
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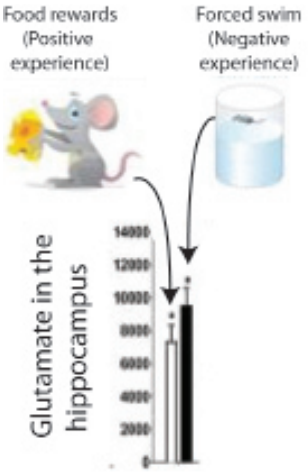
What's it about? The negative health impacts of lead have been known for centuries. Public health professionals emphasize that the effects of lead on children are permanent. However, a new study from the Cory-Slechta lab suggests that life experiences can influence how an individual is impacted by lead exposure.

Why does it matter? The rate of lead poisoning in children under the age of 6 has dramatically decreased since 1978, when lead was banned in household paint. Despite this success, children with elevated blood lead levels can still be found in some areas, particularly those with older homes in poor condition. While research has found that there is no "safe" level of lead, the negative health effects of lead exposure canvary between different people. These differences led researchers to ask what factors influence the impacts of lead, particularly on the brain and behavior.

How was it done? Researchers wanted to study the effects of environmental stress on offspring whose mothers were exposed to lead and stress during pregnancy. Pregnant mice were given lead in their drinking water at a dose that is similar to environmental levels for exposed pregnant women. The pregnant mice were restrained for periods of time to mimic stressful life events. After the mice gave birth, their offspring were split into two groups. Group 1 experienced positive events (food rewards for performing a behavior) to simulate an enriched childhood environment. Group 2 experienced periodic negative events (forced to swim in an enclosed area) to simulate a stressful childhood environment. The researchers examined levels of neurotransmitters in the brain. These neurotransmitters included chemicals like glutamate, which is involved in learning and memory.



Female mice whose mothers were exposed to lead and stress have different amounts of glutamate in their brains depending on whether they had positive or negative experiences.

What did they find? Positive and negative experiences had different effects on neurotransmitters that are related to learning and memory. These effects were different for males and females.

So…what does this mean? More research is needed to determine how positive and negative experiences might change neurotransmitters, and what this means for brain health. This study was a first step toward understanding how children with different life experiences may be affected differently by prenatal lead exposure. It is not clear whether the observed changes in neurotransmitters are positive or negative, but what is clear is that life experience can change the influence of developmental exposure to lead. The next step of this research is to have the offspring mice perform behavioral tests to determine how learning, memory, and social behavior differ between groups.

There are many ways people can be exposed to lead, and fairly easy ways to avoid it. The following are just a few, you can find more information at http://www.cdc.gov/nceh/lead/tips.htm.

- Regularly wet-mop floors and wet-wipe window components. Because household dust is a major source of lead, you should wet-mop floors and wet-wipe horizontal surfaces every 2-3 weeks. Windowsills and wells can contain high levels of leaded dust. They should be kept clean.
- Use only cold water from the tap for drinking, cooking, and making baby formula (Hot water is more likely to contain higher levels of lead. Most of the lead in household water usually comes from the plumbing in your house, not from the local water supply).

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