

# Educational Interventions for Children Affected by Lead

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National Center for Environmental Health  
 Division Name in this space



**Exposure to lead can seriously harm a child's health.**

Damage to the brain and nervous system

Slowed growth and development

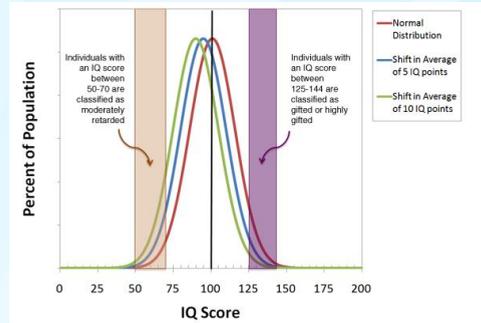
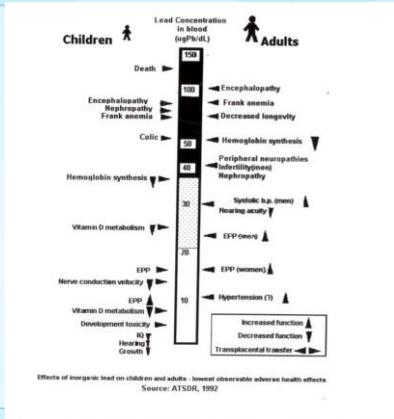
Learning and behavior problems

Hearing and speech problems

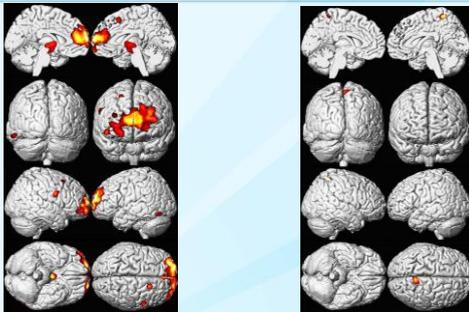
**This can cause:**

- Lower IQ
- Decreased ability to pay attention
- Underperformance at school

Available at [www.cdc.gov/nch/lead](http://www.cdc.gov/nch/lead)



UCLA, 2009



Brain volume loss in males (n=83) mean blood lead level 13.6 µg/dL highlighted over standard brain template  
 Cecil et al. PLoS May 2008

Brain volume loss in females (n=74) mean blood lead level 13.1 µg/dL highlighted over standard brain template

## Effects of Lead on Academic Performance

A series of North Carolina studies of over 57,000 children found that children with a BLL as low as 4 µg/dL at three years of age were significantly more likely to be classified as learning-disabled than children with a BLL of 1 µg/dL (Miranda, et al. 2010).

These results have been replicated in Connecticut where researchers observed the same associations (Miranda, et al. 2011).

In a study of over 48,000 school children in Chicago, BLLs as low as 5 µg/dL were associated with lower scores on third grade reading and math tests (Evens et al. 2013). BLL had a strong relationship with test scores, similar to factors such as birth weight, maternal education, and race/ethnicity.

**Effects of Lead on Academic Performance (cont.)**

In Detroit in 3, 5 and 8 grade children, Zhang, et al. found a strong dose response relationship between BLL and poor performance on academic test scores through junior high school. (Zhang et al. 2013)

In 4-9 grade children in Milwaukee, Amato, et al. found lead exposed children 3 times more likely to be suspended from fourth grade than unexposed peers (Amato et al. 2013).

In Providence, Rhode Island, McLaine, et. al found that compared to children who never had a BLL  $\geq 5 \mu\text{g/dL}$ , reading readiness scores for children were 4.5 and 10 points lower for children with BLLs  $\geq 5 \mu\text{g/dL}$  or  $\geq 10 \mu\text{g/dL}$  as toddlers, respectively. (McLaine et al. 2013)

In an ecological study of achievement scores for 57 counties in New York State, the percent of children in a county with BLLs  $\geq 10 \mu\text{g/dL}$  explained 8-16% of the variance in reading and math test scores even adjusting poverty. (Strayhorn and Strayhorn, 2012)

**Costs of the Effects of Lead on Academic Performance**

In 2010, the Wisconsin Department of Health Services estimated that preventing any lead exposure in children would improve the high school graduation rate and the reduce saving \$28 billion for each one year cohort. (Magzeman et al.2013)

In Massachusetts, reductions in lead have resulted in a 1 to 2 % decrease in children with unsatisfactory standardized test scores, equivalent to a \$1000-\$2000 increase in income per capita. (Reyes,JW., 2011)

Mahoning County OH estimated juvenile justice and special education costs for 279 children diagnosed with a BLL  $\geq 25 \mu\text{g/dL}$  in 2002 cost the county \$0.5 million per year. (Stefanak M et al., 2005)

**Educational Interventions for Children Affected by Lead**

Although no studies specifically examine the impact of early childhood educational (ECE) interventions on cognitive or behavioral outcomes for children affected by lead. However, studies of educational interventions to improve other developmental outcomes demonstrate that children benefit most from interventions applied at an early age. (Glascoe, 2000; Campbell et al., 2001; Anderson et al., 2003)

The economic effects of ECE programs are estimated as \$2-\$3 in economic development per dollar of intervention costs and compare favorably with business incentive programs (Bartik 2011).

The long-term effect on national annual earnings of a well-run universal pre-K education is estimated at about \$300 billion. (Bartik, 2006)

**Programs and policies for children 0- 21 years old**

The Individuals with Disabilities Education Act (IDEA): Federal Special Education Law, serves children 0-21 years old and includes:

Child Find: Gateway to Services- a child identification program that identifies and evaluates children and young people from ages 0 to 21 who are suspected of having disabilities, including those with a history of exposure to lead or a BLL  $\geq 5 \mu\text{g/dL}$ .

Part C: Early Intervention Services for Children Under Age 3- a \$442.7 million (FY 12) program administered by States that serves infants and toddlers through age 2 with developmental delays or who have diagnosed physical or mental conditions with high probabilities of resulting in developmental delays.

*Educational Interventions for Children Affected by Lead, CDC Unpublished*

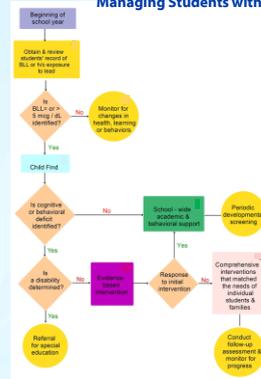
**Programs and policies for children 0- 21 years old**

Part B: Special Education for Children 3-21 Years Old- an \$11.58 billion (FY12) program of grants to state education agencies to partially fund special education and related services for children ages 3-21 with disabilities, including the Section 619 Preschool Program.

Coordinated Early Intervention Service-allows local educational agencies to use  $\leq 15\%$  of Part B to develop and apply non-special education services to students in K-12 (focus on K-3) who have not been identified as needing special education or related services, but who need additional academic and behavioral supports to succeed in a general education environment.

*Educational Interventions for Children Affected by Lead, CDC Unpublished*

**Managing Students with Lead Exposure**



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### Appropriate Services for Lead-Exposed Children

#### States' IDEA Child Find Programs Can:

- Be expanded formally to meet the needs of lead-exposed children.
- Add the state's Childhood Lead Poisoning Prevention Program to the required Interagency Coordinating Council.
- Request children health professionals and advocates inform Child Find of children with BLL  $\geq$  reference value/or inform the parents about Child Find.
- Include Parent Centers in outreach to parents of lead-exposed children.
- Consider a neuropsychological assessment of executive function as well as developmental assessment to identify deficits in all lead-exposed children with BLL  $\geq$  reference value.

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#### States' IDEA Part C Programs Can

- Classify the neuro-cognitive and developmental deficits of BLLs  $\geq$  reference value as qualifying for Part C services.
- Presume eligibility for a child with BLL  $\geq$  reference value since some do not manifest until later years.

#### States' IDEA Part B Programs

- Help local education agencies to identify and provide educational interventions/accommodations, and behavioral/educational strategies for children affected by lead.
- Work with the childhood lead poisoning prevention program to educate local education agency about childhood lead poisoning.
- Develop/deliver training educators, including special educators, in identifying lead related disabilities and behaviors that impede educational success.

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#### Local Education Agencies (LEAs) Can

- Develop policy and procedures regarding services for children who may be affected by lead.
- Educate school personnel about the adverse effects of BLLs on academic performance and behavior.
- Collaborate with partners to educate families about the adverse effects of BLLs.
- Obtain census tract level blood lead data from childhood lead poisoning prevention programs, use the data to identify populations where the risk for high BLLs is disproportionately high, and prioritize these areas for early childhood education referrals and resources.
- Communicate with health and other social service providers about the education needs of children affected by lead.

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#### Pediatric Health Care Providers Can

- Optimize identification of children affected by lead by following the American Academy of Pediatrics (AAP) recommendations for developmental surveillance and referral.
- Provide developmental and behavioral surveillance throughout childhood and adolescence.
- Do not wait for a specific diagnosis before initiating an early intervention (EI) referral.
- Implement a system to track referrals and obtain permission at the time of referral to facilitate communication between the EI program or school and the medical home.
- Become knowledgeable about state eligibility criteria, and definition of developmental delay.
- Assist families with obtaining needed services.

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#### Childhood Lead Poisoning Prevention Programs Can

- Educate parents and health care providers.
- Develop interagency agreements to provide the names of children with blood lead above the reference value to the Child Find system and local education agencies.
- Consider adding referral to Child Find to their case management protocol and track enrollment results.
- Develop a system for contacting families when children turn 3, even if discharged from lead case management.
- Enlist the Child Find agency and early intervention service providers in screening and surveillance effort so that children identified through those systems and their siblings are screened.
- Help the Child Find agency and local education agencies to target outreach and services to children most likely to have BLLs above the reference value.

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## Lead poisoning is a problem we can fix.



[www.cdc.gov](http://www.cdc.gov) | Contact CDC at: 1-800-CDC-INFO or [www.cdc.gov/info](http://www.cdc.gov/info)

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

National Center for Environmental Health  
Division of Emergency and Environmental Health Services



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**The views and opinions expressed in this presentation are those of the author and do not necessarily represent official policy or position of the Ohio Department of Health.**