RESEARCH ON CHILDREN'S LEAD EXPOSURE: PARENT AWARENESS AND TREATMENT EFFECTIVENESS

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Lead in the environment has been identified as one of the major preventable causes of cognitive deficiencies of children in the United States. (Bellinger and Needleman 1992). Since the 1970s, release of lead into the environment has been greatly reduced due to regulations on gasoline additives, paint and, most recently, water delivery equipment, leading to a significant public health victory: overall, mean blood lead among children in the USA has fallen to very low levels (Brody et al I994). However, this victory has come with a cost of reduced public awareness and concern regarding the large number of children, especially in low-income inner city neighborhoods in the Northeastern US, who are still exposed to lead levels high enough to cause significant cognitive defects. Children are exposed to lead through dust from old paint on interior and exterior housing surfaces, from playing in roadside areas still contaminated from the era of leaded gasoline, from galvanized and lead-soldered pipes in urban water systems, and from folk remedies and cosmetics used among some ethnic groups. There is also evidence that damage due to lead occurs disproportionately among African-American children as compared to other groups, at the same level of lead exposure, a difference that may be related to nutritional issues (Banks, Shucard and Ferretti, 1997). In the mid 1990s, results of a national survey estimated that 1.7 million children in the USA have blood levels over 10 micrograms per deciliter, the current "level of concern" of the Centers for Disease Control (Brody et al, 1994;CDC, 1991) Worldwide, China, Mexico, and many other nations have little control over environment release of lead, with correspondingly

alarming levels of high lead exposure in children, an enormous threat to the future of the world's population (Lin-Fu 1992, Romieu, Palazuelos, Menesses and Hernandez-Avila, 1992). Recently, lead in the aging population has become another area of concern, as lead acquired early in life and stored in bones is released into the bloodstream when bone loss occurs, possibly contributing to cognitive losses among older adults (Brody, 1994); Silbergeld, 1992).

Assessment of the precise effects of lead on children's development is complicated by other risk factors associated with poverty; nonetheless, epidemiological and psychometric findings have been bolstered by overwhelming evidence from laboratory studies, both of lead-exposed animals and of cells, showing many specific ways in which lead damages the nervous system (Banks, Shucard and Ferretti, 1997). Lead effects are greatest in the developing nervous system, prenatally and in the first two years of life. Precise specification of how lead affects children's mental development has been hampered by a lack of effective tests of different cognitive functions among young children (Banks, Shucard and Ferretti, 1997).

The goal of sustainable environment includes elimination of human exposure to toxic substances, such as lead, through lead abatement in housing, reducing access to 22 lead-infested soil in play areas, and modernization of water systems. While awaiting these solutions, simple and inexpensive measures in the home, with effective parent education, can reduce a child's risk. Toddlers are at high risk, not only because of their rapid brain development, but because they play on floors and put objects in their mouths. Household cleaning methods, frequent hand washing, and dietary interventions including calcium and iron, can reduce lead exposure.

The proposed student-faculty research project has two parts.

First we want to conduct an interview/survey research project in two lead-affected neighborhoods of Buffalo, with parents of young children, about their awareness of the risks of lead and what they can do to reduce these risks. Recently New York State has conducted a televised publicity campaign about childhood lead exposure. Has this message reached the parents who need it? One intended site is the Seneca-Babcock community and the second is an East Side community. The results of this study can be used to increase local awareness and to plan intervention programs through Daemen College's continuing involvement in these communities.

The second part of the proposed research is a neuropsychological assessment of children who are under treatment for lead exposure. Melinda Cameron, M.D., who leads the Western NY Lead Poisoning Prevention Resource Center, has indicated an interest in collaborating with this research; her involvement will make it possible to gain access to patients and records. Children discovered to have relatively high levels of lead exposure are hospitalized and treated by chelation; however, there has not been any local follow up study of children who have received treatment over the past 25 years. In addition to initiating longitudinal research with lead-exposed children under treatment in Buffalo, this study will use assessment methods targeted to specific cognitive functions believed to be affected by lead, rather than using composite developmental inventories as has been done in much previous research. This approach is expected to help identify more precisely ~ lead exposure affects cognition, an important issue for educational intervention. Relevant Institutional Review Board procedures will be followed. It is anticipated that preliminary findings of the neuropsychological study will lead to further research proposals. The faculty applicant (ECB) has training and experience with the relevant neuropsychological measures and well as with survey research and parent interviews.

Both parts of the study will involve one, or if possible, two student researchers, both senior Psychology majors. One of the anticipated student researchers has completed a field experience in neuropsychological assessment and will assist with that part of the study. The other is a student of inner-city background who has involvement and ties with community organizations and a strong interest in children's health.

References

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