EVIDENCE MOUNTS FOR LINK BETWEEN DIET, CHILDREN'S BEHAVIOR

Prenatal or childhood malnourishment may lead to bad behavior as well as poor health, according to a new research review.

Jianghong Liu and Adrian Raine examined clinical, laboratory, and epidemiological studies, and say, "Different lines of evidence support the view that poor nutrition contributes to the development of child behavior problems." Among the research they cite:

- Children who experience "protein-energy malnutrition" in infancy have significant attention deficits, and those with deficiencies of protein, zinc, and iron at three years of age exhibit more "externalizing" behaviors (such as aggression) in childhood and adolescence.
- Studies link iron deficiency, which affects up to half of children worldwide, to both aggression and conduct disorder.
- Rats deprived of zinc during prenatal development are more aggressive than controls, and human studies show a link between zinc deficiency and hyperactivity.
- Research indicates that deficiencies of "micronutrients" can interact with exposure to heavy metals to increase the risk of antisocial behavior.
- Although findings are not consistent, several animal and human studies indicate that low levels of omega-3 fatty acids can increase aggression.

Liu and Raine say there is evidence that cognitive impairments due to prenatal or early-childhood malnutrition may be at least partially reversible. Their own research, they note, shows that enrichment programs that include better nutrition can significantly reduce conduct disorder and early-adult criminal behavior. They also cite the work of Bernard Gesch (see related article, *Crime Times*, 2002, Vol. *8,* No. 3, Page 1), who found that dietary supplements can dramatically reduce antisocial acts in a prison population. In addition, they point to a study by Stephen Schoenthaler and I. D. Bier, in which schoolchildren who received a vitamin- mineral supplement for four months showed a 47% reduction in antisocial behavior compared to children who received a placebo.

Liu and Raine say malnutrition could affect behavior directly-by altering brain cell growth and development, changing neurochemistry, or increasing vulnerability to the effects of toxins-or indirectly, by causing IQ reductions that in turn are associated with behavior problems.

"The effect of childhood malnutrition on externalizing behavior," Jianghong Liu and Adrian Raine, *Current Opinion in Pediatrics, Vol. 18,* 2006, 565-70. Address: Jianghong Liu, Department of Psychology, University of Southern California, Los Angeles, CA 90089-0375, jianghol@usc.edu.