

USC News

Nutrition Key to Aggressive Behavior

11/16/04

Early malnutrition may lead to low IQ and later antisocial behavior, says a new USC study. The work is an important first step in identifying early risk factors for adult violence and developing programs to prevent it.

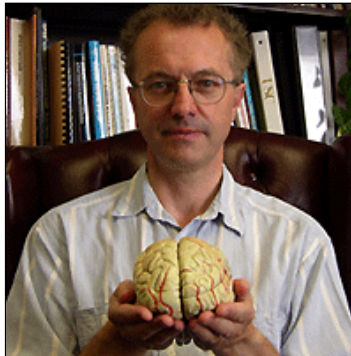
By Usha Sutliff

Malnutrition in the first few years of life leads to antisocial and aggressive behavior throughout childhood and late adolescence, according to a new USC study.

"These are the first findings to show that malnutrition in the early postnatal years is associated with behavior problems through age 17," said Jianghong Liu, a postdoctoral fellow with USC's Social Science Research Institute and the lead author of the study published in the American Journal of Psychiatry's November issue.

"Identifying the early risk factors for this behavior in childhood and adolescence is an important first step for developing successful prevention programs for adult violence," she said.

For 14 years, researchers followed the nutritional, behavioral and cognitive development of more than 1,000 children who lived on Mauritius, an island in the Indian Ocean off the coast of Africa.



"There's more to antisocial behavior than nutrition, but we argue that it is an important missing link," said Adrian Raine, a coauthor of the study.

Photo/Usha Sutliff

The sample of boys and girls included children with Indian, Creole, Chinese, English and French ethnicities.

Researchers assessed their nutrition at age 3, looking for four indicators in particular:

- angular stomatitis, or cracking in the lips and corners of the mouth that is caused by a deficiency of the B vitamin riboflavin;
- hair dyspigmentation, a condition – found primarily in tropical regions – where children's hair takes on a reddish-orange color due to protein deficiency;
- sparse, thin hair created by a deficiency in protein, zinc and iron; and
- anemia, which reflects iron deficiency.

The children's intelligence level and cognitive ability were also tested, and social workers visited their homes to come up with a so-called adversity score that summarized factors such as the income, occupation, health, age and education levels of their parents and their overall living conditions.

At ages 8, 11 and 17 years, the researchers looked at how the children were behaving in school and at home.

At age 8, teachers gave feedback about whether the subjects were acting out in school with behavior ranging from irritability to picking fights with other children.

At age 11, the feedback came from parents who told researchers about whether their children lied, cheated, got into fights, bullied others, destroyed property or used obscene language.

At age 17, both parents and teachers reported on antisocial behavior such as stealing, drug use, destroying property or being deliberately cruel to others.

Over time, a link became evident between malnourishment and antisocial or aggressive behavior, said Adrian Raine, a coauthor of the study and holder of the Robert Grandford Wright Professorship in Psychology in USC's College of Letters, Arts and Sciences.

Compared to those in the control group – the group that did not suffer from nutritional deficiencies – malnourished children showed a 41 percent increase in aggression at age 8, a 10 percent increase in aggression and delinquency at age 11 and a 51 percent increase in violent and antisocial behavior at age 17.

While social class did not play a significant factor in behavior, intelligence level did, Raine said.

"Poor nutrition, characterized by zinc, iron, vitamin B and protein deficiencies, leads to low IQ, which leads to later antisocial behavior," he said. "These are all nutrients linked to brain development."

Researchers also found that the more indicators of malnutrition there were, the greater the antisocial behavior.

The findings have implications for the United States, Raine said, where 7 percent of toddlers suffer from iron deficiency, a number that jumps to between 9 percent and 16 percent in adolescent and female groups.

Iron deficiency is between 19 percent and 22 percent in black and Mexican American females, he said.

"This is a problem in America. It's not just a problem in the far-away Indian Ocean," Raine said. "If it's causal, there's an intervention implication there. At a societal level, should parents be thinking more about what kids are eating?"

The study also casts antisocial behavior in a light where it may be preventable.

"There's more to antisocial behavior than nutrition, but we argue that it is an important missing link," Raine said. "Biology is not destiny. We can change the biological disposition to antisocial and aggressive behavior."

The other authors were Sarnoff A. Mednick, a professor of psychology in USC College and director of the USC Social Science Research Institute, and Peter H. Venables, a professor of psychology at the University of York, England.