

Fall 2007

Nutrient Deficiencies and Child Cognition

16:709:620 Advanced Topics in Nutritional Sciences

Index # 28028

E/O Tuesday 3:55-5:55 PM

216 Davison Hall

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Course Description:

Protein-energy malnutrition and other micronutrient deficiencies have long been studied for their impact on reducing physical growth and compromising health. In recent years, such forms of undernutrition have been examined with regard to their effects on behavior in general and cognitive functioning, in particular. With children especially, deficiencies in micronutrients have been shown to have effects on the developing brain resembling those of neurotoxicants. In this course, we will examine the individual and sometimes confounded effects of nutrient deficiencies on children's cognitive development and performance. Aspects of child cognition to be addressed in the course will include attention, sensorimotor behavior, expressive language, psychometric intelligence, and achievement motivation.

Learning objectives:

Through the readings, discussions, and exercises of this course, students will gain:

1. a knowledge of how nutritional deficiencies directly reduce mental performance;
2. an understanding of how such deficiencies interact with the child's environment;
3. an increased ability to scrutinize scientific articles that address child behavior; and
4. familiarity with some specific tests that are commonly used in measuring child cognitive abilities and development.

Course requirements:

1. Participation: 30%
2. Identify, review and critique a research article on one of the course topics: 35%
3. Illustrate and evaluate a child assessment instrument used in a covered study: 35%

September 4th

Week 0—Overview and course requirements

September 11th

Week 1—Nutrition vs. socioeconomic status and child outcomes

Bradley, R.H., & Corwyn, R.F. (2002). Socioeconomic status and child development.

Annual Review of Psychology, 53, 371-399.

Espinosa, M.P, Sigman, M.D., Newmann, C.G., Bwibo, N.O., & McDonald, M.A.

(1992). Playground behaviors of school-age children in relation to nutrition, schooling, and family characteristics. *Developmental Psychology, 28*(6), 1188-1195.

September 25th

Week 2—The functional isolation hypothesis

Levitsky, D.A., & Barnes, R.H. (1972, April 7th). Nutrition and environmental interactions in the behavioral development of the rat: Long-term effects. *Science*, 176, 68-71.

Wachs, T.D. (2000). Nutritional deficits and behavioral development. *International Journal of Behavioral Development*, 24(4), 435-441.

October 9th

Week 3—Protein-energy malnutrition

Worobey, J. (2006). Effects of chronic and acute forms of undernutrition. In J. Worobey, B.J. Tepper & R.B. Kanarek, *Nutrition & Behavior: A multidisciplinary approach* (pp.63-80). Wallingford, Oxfordshire: CABI Publishing.

Grantham-MacGregor, S., Cheung, Y.B., Cueta, S., Glewwe, P., Richter, L., Strupp, B., and the International Child Development Steering group. (2007, January 6th). Child development in developing countries: Developmental potential in the first 5 years for children in developing countries. *Lancet*, 369, 60-70.

October 23rd

Week 4—Acute undernutrition: Breakfast studies

Pollitt, E., & Matthews, R. (1998). Breakfast and cognition: An integrative summary. *American Journal of Clinical Nutrition*, 67(suppl.), 804S-813S.

Worobey, J., & Worobey, H.S. (1999). The impact of a two-year school breakfast program for preschool-aged children on their nutrient intake and pre-academic performance. *Child Study Journal*, 29(2), 113-131.

November 6th

Week 5—Iron deficiency

McCann, J.C., & Ames, B.N. (2007). An overview of evidence for a causal relation between iron deficiency during development and deficits in cognitive or behavioral function. *American Journal of Clinical Nutrition*, 85, 931-945.

Lozoff, B., Corapci, F., Burden, M.J., Kaciroti, N., Angulo-Barroso, R., Sazawal, S., & Black, M. (2007). Preschool-aged children with iron deficiency show altered affect and behavior. *The Journal of Nutrition*, 137, 683-689.

November 27th

Week 6—Zinc and iodine deficiency

Black, M. (2003). The evidence linking zinc deficiency with children's cognitive and motor functioning. *The Journal of Nutrition*, 133, 1373S-1476S.

Choudhury, N., & Gorman, K.S. (2003). Subclinical prenatal iodine deficiency negatively affects infant development in northern China. *The Journal of Nutrition*, 133, 3162-3165.

December 11th

Week 7—Long-chain polyunsaturated fatty acids

Cheatham, C.L., Colombo, J., & Carlson, S.E. (2006). N-3 fatty acids and cognitive and visual acuity development: Methodological and conceptual considerations. *American Journal of Clinical Nutrition*, 83(suppl.), 1458S-1466S.

Auestad, N., Scott, D.T., Janowsky, J.S., Jacobsen, C., Carroll, R.E., Montalto, M.B., Halter, R., Qiu, Jacobs, J.R., Connor, W.E., Connor, S.L., Taylor, J.A., Neuringer, M., Fitzgerald, K.M., & Hall, R.T. (2003). Visual, cognitive, and language assessments at 39 months: A follow-up study of children fed formulas containing long-chain polyunsaturated fatty acids to 1 year of age. *Pediatrics*, 112(3), e177-e183. <http://www.pediatrics.org/cgi/content/full/112/3/3177>