

Association between early and current LCPUFA status on academic achievements at age 7: Is there an early programming effect?

ISM van der Wurff¹, EC Bakker¹, G Hornstra², PA Kirschner¹, M Zeegers², RHM de Groot¹

¹ Open University of the Netherlands, Heerlen, the Netherlands

² University Maastricht, Maastricht, the Netherlands

Contact: xiw@ou.nl / +31 (0)45 576 2909

Introduction

Long-chain polyunsaturated fatty acids (LCPUFA) such as docosahexaenoic acid (DHA) are important constituents of the central nervous system. The incorporation of LCPUFA in the brain occurs mainly during the brain's growth-spurt in the last trimester of pregnancy and the first year of life. While a number of studies have found positive effects of higher LCPUFA status during pregnancy and of supplementation in the first year on cognition^{1,2}, there are studies that do not confirm this³. The long-term effect of prenatal as well as current LCPUFA status on academic achievements at school age remains unstudied.

Objective

To study the association between both prenatal and current LCPUFA status on academic achievement of healthy 7-8 year old children.

Study design

Observational study. Children who participated in MEFAB (Maastricht Essential Fatty Acid Birth cohort), a unique historical cohort of about 1100 Caucasian children, were asked to participate in this study, yielding a sample of 150 children. Maternal plasma phospholipid fatty acid status during pregnancy and of the child at age 7 was determined. In addition, venous umbilical cord fatty acid status just after birth was determined. At age 7 school achievement was determined (i.e., reading, spelling and arithmetic) with standard tests used at schools in the Netherlands. Information regarding covariates which could have influenced the child were collected. Data was analysed with a categorical regression analysis (CATREG).

Results

For arithmetic a negative association with DHA was found at all time points. Similar results were seen for AA and EPA. For ObA positive associations were found. For spelling and reading there was a positive association with DHA status at 7 years. For the other FA the association with spelling and reading was less clear.

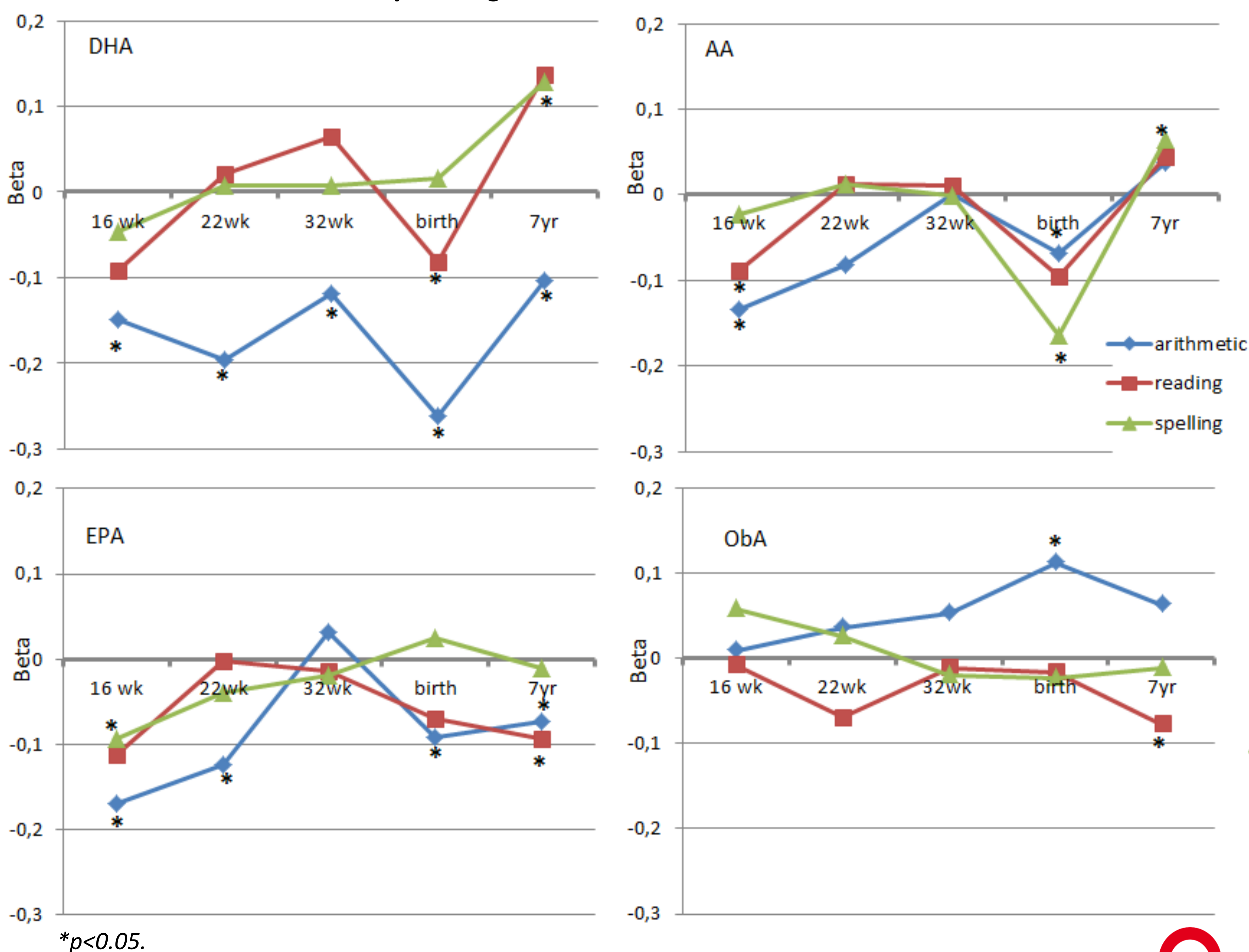
Fatty acids status of the mother at 16, 22 and 32 weeks of pregnancy, child's umbilical cord at birth and child's plasma at 7 years of age.

Fatty acid (%wt/wt of total FA)	Maternal plasma PL at 16 wks. (n=152)	Maternal plasma PL at 22 wks. (n=152)	Maternal plasma PL at 32 wks. (n=148)	Umbilical plasma PL (n=157)	Plasma PL at 7 years (N=140)
DHA 22:6n-3	3.96 ± 0.82	4.07 ± 0.81	3.95 ± 0.73	6.04 ± 1.34	2.99 ± 0.80
EPA 20:5n-3	0.51 ± 0.39	0.36 ± 0.16	0.37 ± 0.23	0.23 ± 0.12	0.66 ± 0.40
AA 20:4n-6	9.63 ± 1.50	8.55 ± 1.23	8.12 ± 1.15	16.50 ± 1.70	9.15 ± 1.18
ObA 22:5n-6	0.35 ± 0.12	0.45 ± 0.15	0.47 ± 0.14	0.85 ± 0.26	0.28 ± 0.09

Discussion

The results of this study are in contrast to our expectations. DHA status during pregnancy, at birth and at 7 years of age was negatively associated with arithmetic scores at age 7. But DHA status at 7 years was positively associated with spelling and reading scores. Overall there does not seem to be a specific early programming effect, but there are effects of early life time exposure to DHA.

Beta values for the association between fatty acid status at different time points and academic achievement at 7 yrs. of age corrected for covariates.



Declaration of interest

No conflict of interest

References

- Strain 2012, J. Nutr.
- Colombo 2013, Am. J. Clin. Nutr.
- de Jong 2010, Br. J. Clin. Nutr.

