

- Topics:** Normal children, omega-3 fatty acids, docosahexaenoic acid (DHA), eicosapentaenoic acid (EPA), long chain polyunsaturated fatty acids (LC-PUFAs), cognitive performance, behaviour
- Objective:** To collect needed data on the blood LC-PUFA status of healthy UK children from mainstream schools. To determine associations between blood omega-3 and omega-6 fatty acid status and children's reading, working memory and ADHD-type symptoms.
- Background:** LC-PUFAs, in particular DHA are essential for brain development and function and overall physical health. Low blood Omega-3 LC-PUFA have been measured in children with ADHD and related behavior/learning disorders, while benefits from dietary supplementation with these nutrients have also been reported. However, few studies have investigated the blood fatty acid status in the general childhood population.
- Method:** This cross-sectional, observational study included 493 children aged 7-9 years from mainstream primary schools in Oxfordshire, UK who had below average reading performance in national assessments at age 7. This cohort was obtained through the screening stage of an intervention study dubbed the DOLAB study to determine if DHA supplementation would improve reading, working memory and behavior.
Inclusion criteria: No significant learning difficulty (were not described as having Special Education Needs), their first language at home was English, their reading ability was below average according to national assessments at age 7 years and/or their teachers' current judgement. They were not excluded if they had previously been diagnosed with ADHD and/or dyslexia. The following assessments were completed:
1. **Demographic data** was collected including eligibility for free school meals, sex, age, consumption of fish, use of medication and use of omega-3 supplements.
 2. **Whole blood fatty acid status**
 3. **Reading ability** according to the Word Reading Achievement sub-test of the British Ability Scales 2nd Edition.
 4. **Working memory** assessed using the Recall of Digits Forward and Recall of Digits Backward sub-tests from the BAS II.
 5. **Behavior** (ADHD-type Symptoms) assessed by both parents and teachers using long versions of the Conners' Rating Scales (CPRS-L and CTRS-L)
- Findings:** DHA and EPA were only 1.9% and 0.55% respectively of total blood fatty acids, with DHA having more individual variation. Controlling for sex and socio-economic status, lower DHA concentrations were associated with poorer reading ability (std. OLS coeff.=0.09, $p<.042$) and working memory performance (0.14, $p<.001$). Lower DHA was also associated with higher levels of parent rated oppositional behavior (-0.175, $p<.0001$), emotional lability (- 0.178, $p<.0001$), anxiety (-0.123, $p<0.014$), psychosomatic symptoms (-0.116, $p<0.02$) and Conners' Global Index (-0.122, $p<0.013$).
- Conclusion:** DHA and other Omega-3 LC-PUFAs were low relative to adult cardiovascular health recommendations, and directly related to measures of cognition and behaviour in this group of healthy UK children with below average reading ability. These findings suggest that the benefits from dietary supplementation with Omega-3 LC-PUFA reported for ADHD, Dyspraxia, Dyslexia, and related learning disorders might extend to the general school aged population.
- Relevance to:** Efalex Concentrate, Efalex
- Reference** Montgomery P, Burton JR, Sewell RP, Spreckelsen TF, Richardson AJ. Low Blood Long

Chain Omega-3 Fatty Acids in UK Children Are Associated with Poor Cognitive Performance and Behavior: A Cross-Sectional Analysis from the DOLAB Study. PLoS One. 2013 Jun 24;8(6):e66697. doi: 10.1371/journal.pone.0066697.

PRESS RELEASE**Poor Cognitive Performance and Behavior is associated with Low DHA status in School Aged Children with Reading Difficulties¹.**

A newly published study investigating the associations between blood omega-3 and omega-6 fatty acid status and children's reading, working memory and attention deficit hyperactivity disorder (ADHD)-type symptoms has shown that poor cognitive performance and behavior is associated with low docosahexaenoic acid (DHA) status in school aged children with reading difficulties.

This cross-sectional, observational study completed at the Centre for Evidence-Based Intervention, University of Oxford, UK, included 493 children aged 7-9 years from mainstream primary schools in Oxfordshire, UK who had below average reading performance in national assessments at age 7. Demographic data for each child was collected including eligibility for free school meals, sex, age, consumption of fish, use of medication and use of omega-3 supplements. Whole blood fatty acid status was determined as well as *reading ability* according to the Word Reading Achievement sub-test of the British Ability Scales 2nd Edition, *working memory* assessed using the Recall of Digits Forward and Recall of Digits Backward sub-tests from the BAS II, and *behavior (ADHD-type symptoms)* assessed by both parents and teachers using long versions of the Conners' Rating Scales.

The results showed that DHA and eicosapentaenoic acid (EPA) were relatively low compared to adult cardiovascular health recommendations representing only 1.9% and 0.55% respectively of total blood fatty acids, with DHA having more individual variation. Controlling for sex and socio-economic status, lower DHA concentrations were associated with poorer reading ability and working memory performance. Lower DHA was also associated with higher levels of parent rated oppositional behavior, emotional lability, anxiety, psychosomatic symptoms and the Conners' Global Index (-0.122, $p < 0.013$).

These findings suggest that the benefits from dietary supplementation with omega-3 long chain polyunsaturated fatty acids (LC-PUFAs) previously reported for ADHD, dyspraxia, dyslexia, and related learning disorders might extend to the general school aged population.

To date, only one other study has explored the LC-PUFA status in mainstream UK school aged children relative to their cognitive and behavioral abilities². That study include 450 children aged 8-10 years from a mainstream school population enrolled in an intervention study assessing the effects of a LC-PUFA supplement on measures of cognitive performance and behavior. Using buccal cell fatty acids profiles, the researchers found that higher omega-3s were associated with decreased levels of inattention, hyperactivity, emotional and conduct difficulties and increased levels of prosocial behaviour. These results support the conclusions of the current study.

References:

1. Montgomery P, Burton JR, Sewell RP, Spreckelsen TF, Richardson AJ. Low Blood Long Chain Omega-3 Fatty Acids in UK Children Are Associated with Poor Cognitive Performance and Behavior: A Cross-Sectional Analysis from the DOLAB Study. *PLoS One*. 2013 Jun 24;8(6):e66697. doi: 10.1371/journal.pone.0066697.
2. Kirby A, Woodward A, Jackson S, Wang Y, Crawford MA. Children's learning and behaviour and the association with cheek cell polyunsaturated fatty acids. *Research in developmental disability*. 2010;31:731-742.