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The importance of the fatty acids in childrens cognitive functions

Medical Conference Porto 3rd-4th November 2016

Dr. med Michael Gesche

Preventive Medicine

Orthomolecular Medicine

General-Trauma-Surgeon

General Practioner



SCHOOL FOOD POLICY COUNTRY FACTSHEETS



PORTUGAL





Demographic data

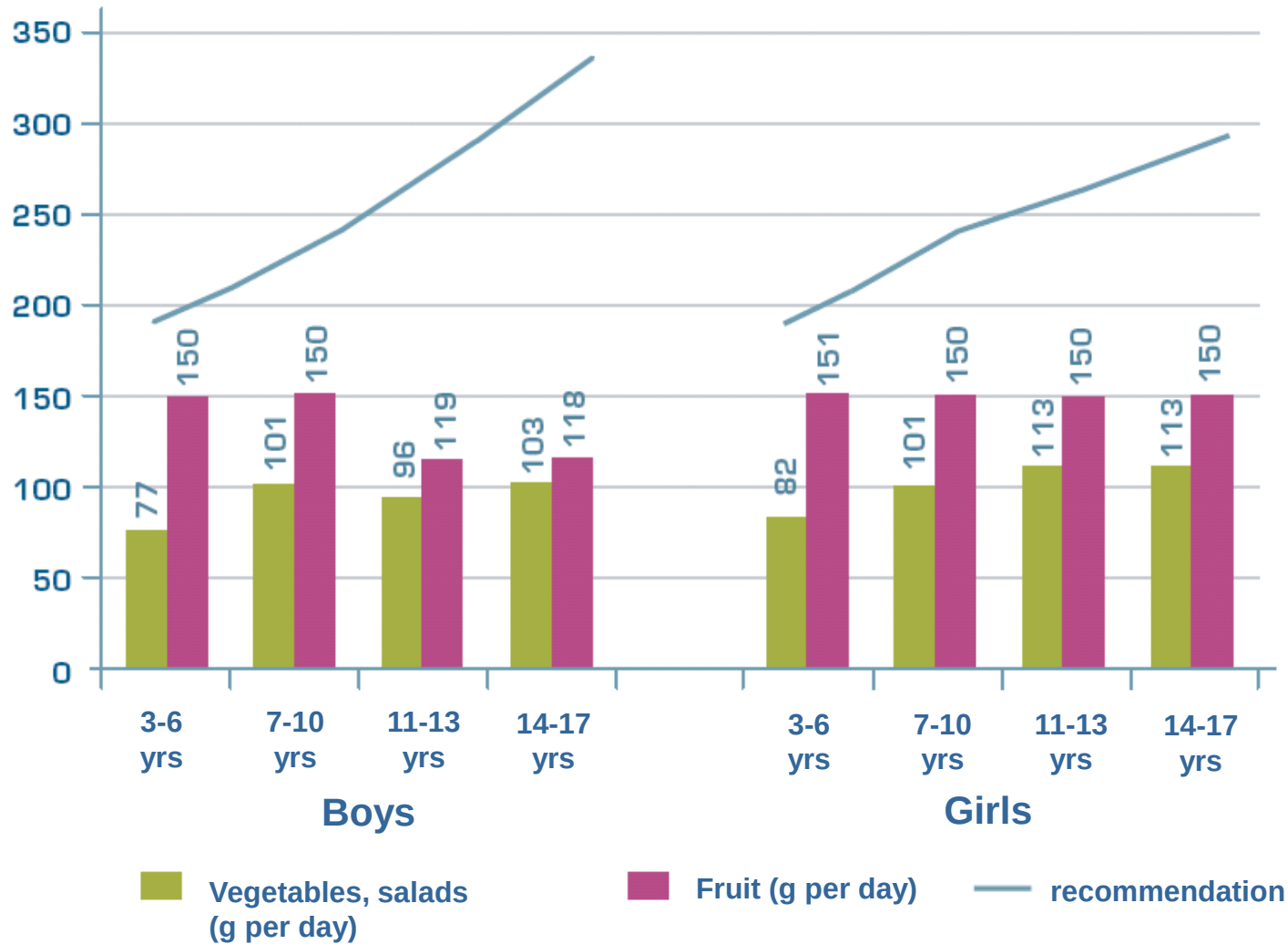
School-age population		Total population	School-aged children as % of total population
5 to 9 years	513,870	10,487,289 	15% 
10 to 14 years	555,366		
15 to 19 years	551,206		
Total 5 to 19 years	1,620,442		

Prevalence of nutritional inadequacy among Portuguese children

ACTA MÉDICA PORTUGUESA

- In conclusion, the prevalence of inadequate intakes of calcium, vitamin E, folate, molybdenum and fibre was unacceptably high, while the contribution of total fat, saturated fat and sugars were far above the recommended by WHO. This could be associated to major chronic diseases, such as coronary heart diseases, in later life.

Average amounts of dietary fruit and vegetables compared to the recommended amount



KiGGS Survey 2007

EsKiMo

Selected results (ages 12 to 17 years)

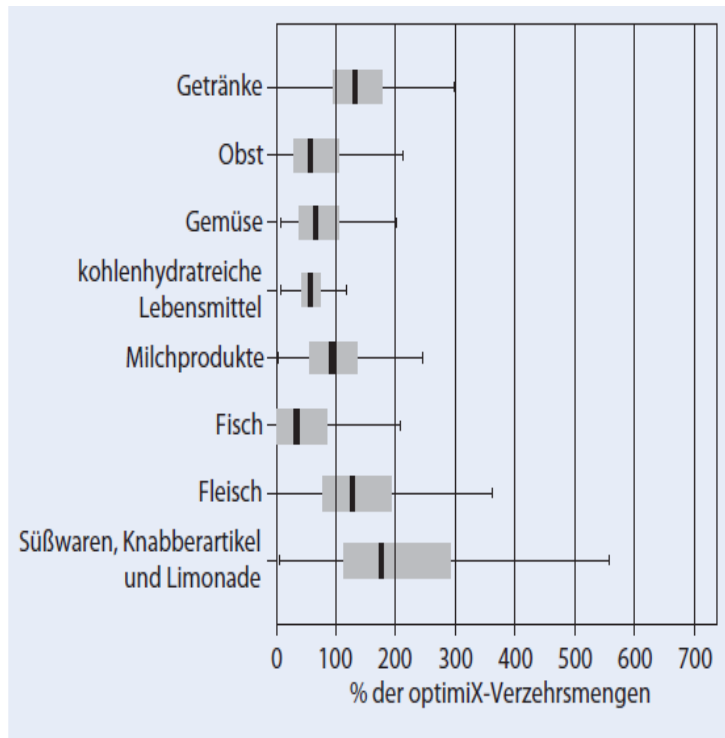


Abb. 4 ▲ Verteilungen der erreichten Prozentanteile der Empfehlung für Lebensmittelgruppen, Mädchen, 12 bis 17 Jahre; angegeben sind Median, Interquartilbereich, Minimum und Maximum (ohne Ausreißer und Extremwerte)

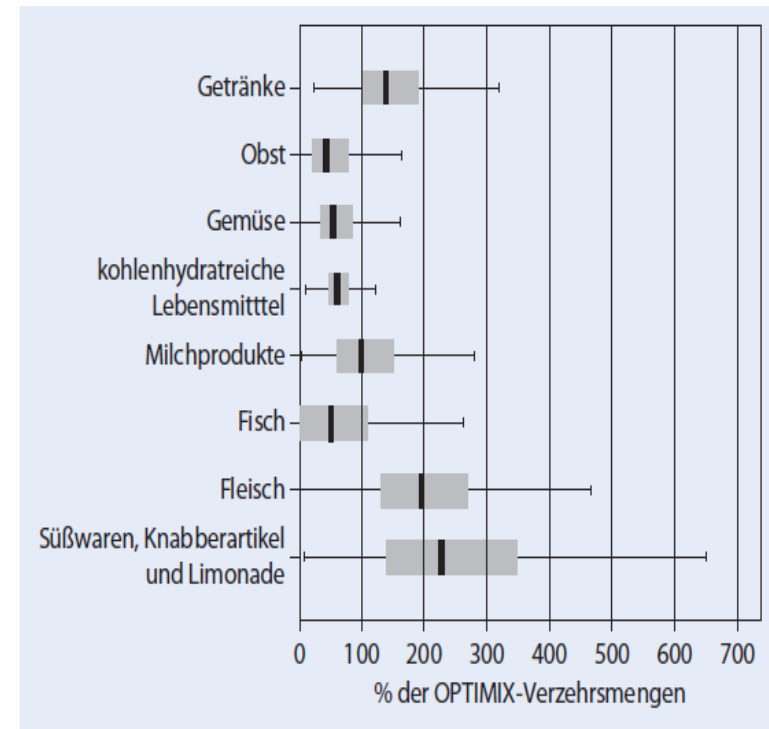
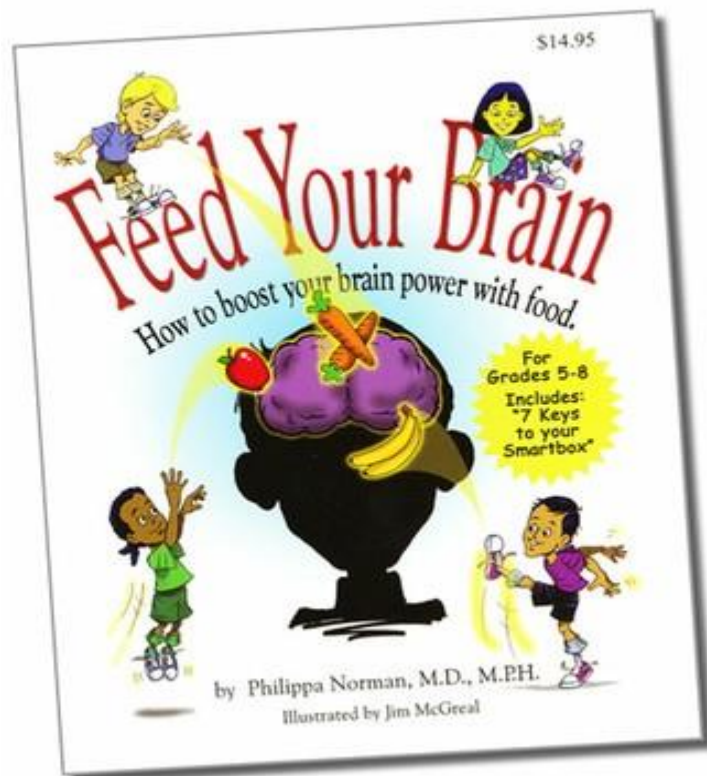


Abb. 3 ▲ Verteilungen der erreichten Prozentanteile der Empfehlung für Lebensmittelgruppen, Jungen, 12 bis 17 Jahre; angegeben sind Median, Interquartilbereich, Minimum und Maximum (ohne Ausreißer und Extremwerte)



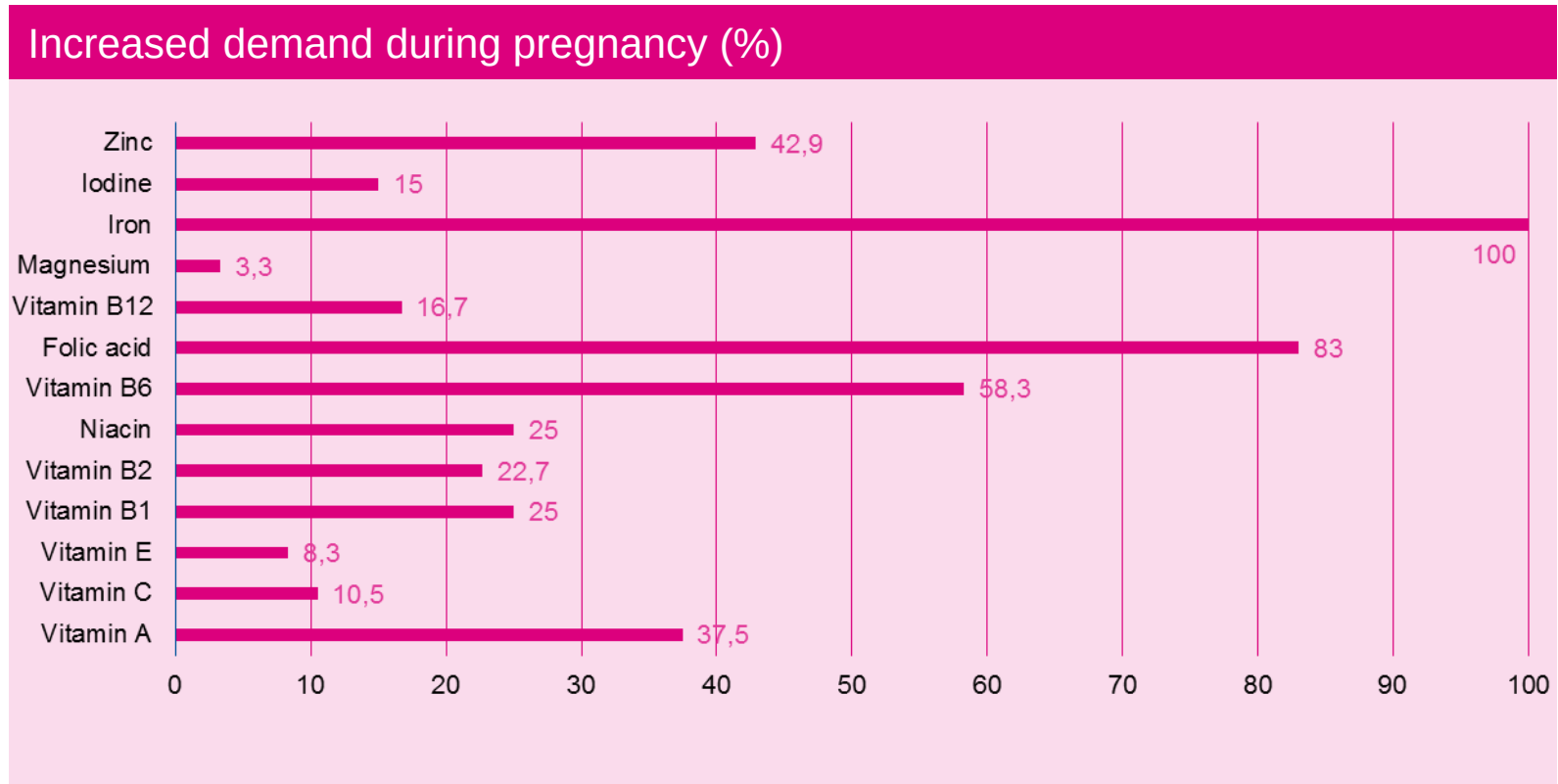
Dr Alex Richardson

they are what you feed them

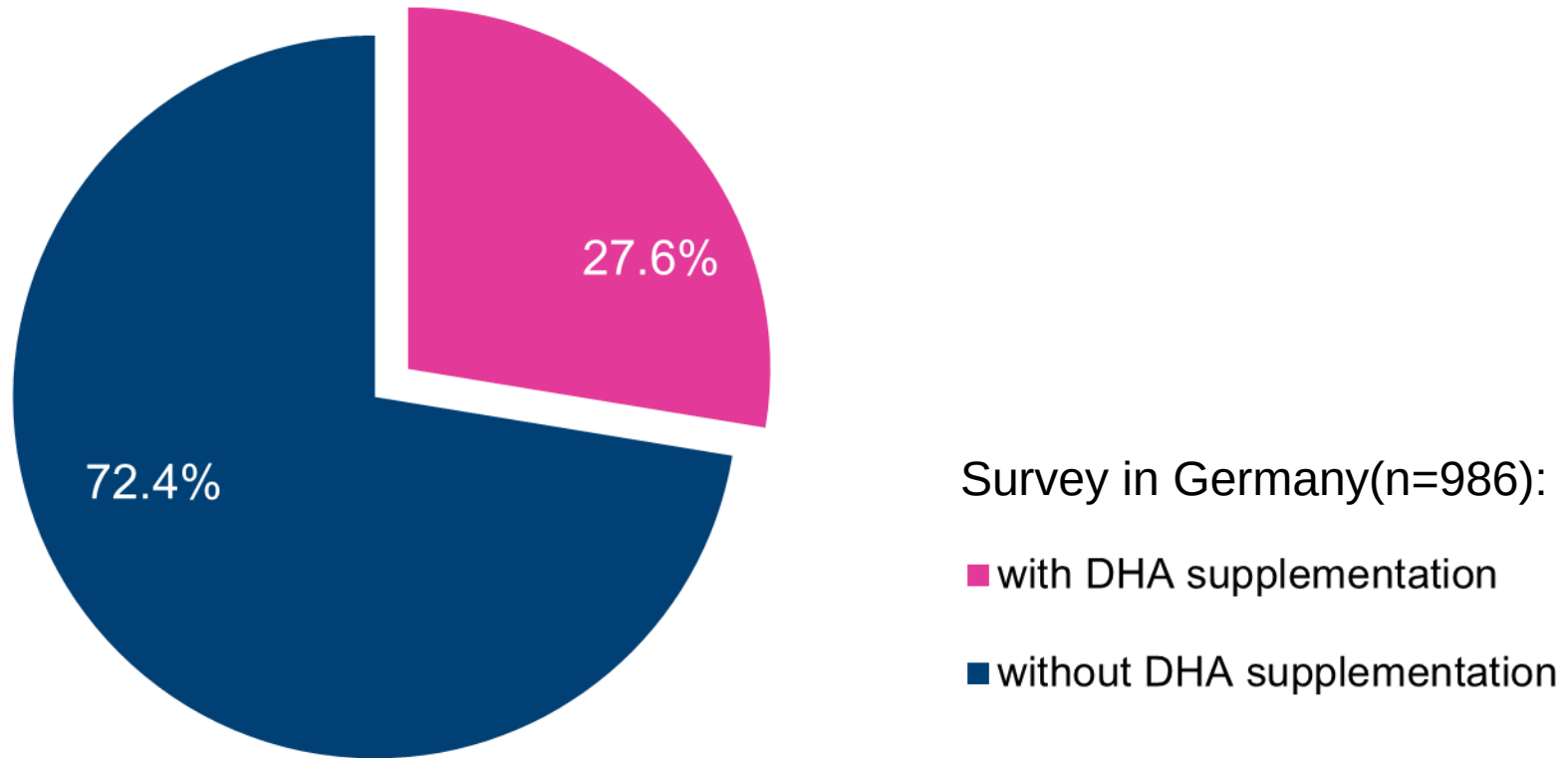
how food affects
your child's
behaviour, mood
and learning



Pregnant = to eat for two?

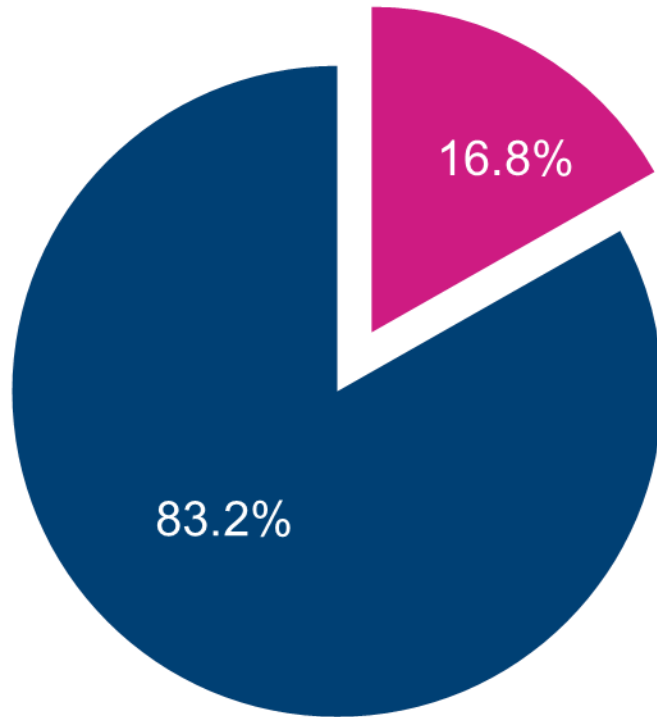


DHA use during pregnancy



27.6% of mothers took DHA during pregnancy

DHA use during breastfeeding



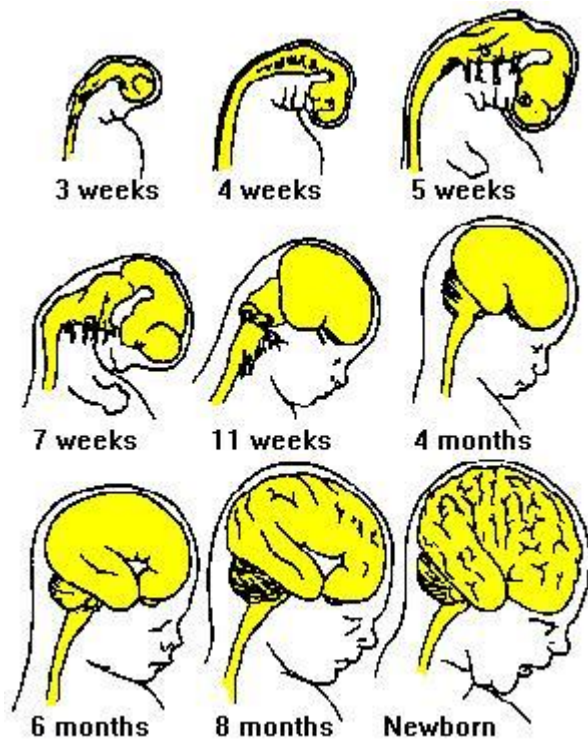
Survey in Germany (n=986):

■ with DHA supplementation

■ without DHA supplementation

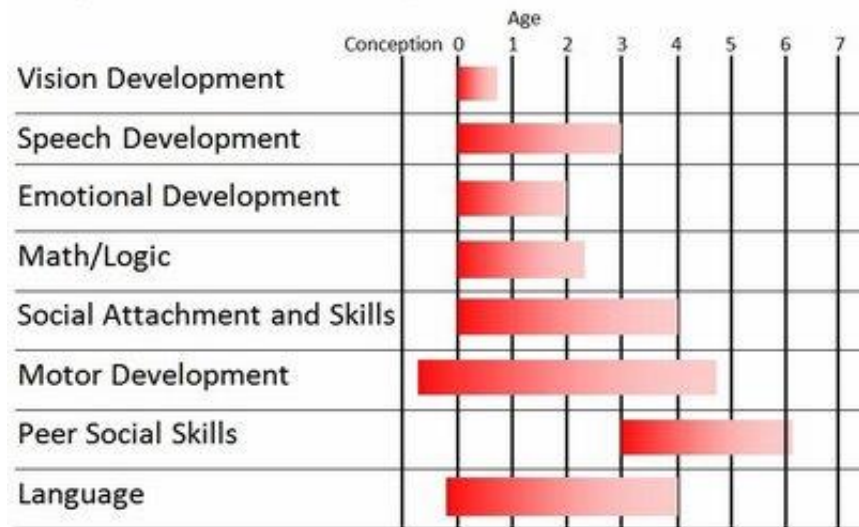
16,8% of mothers took DHA during breastfeeding.

Brain development

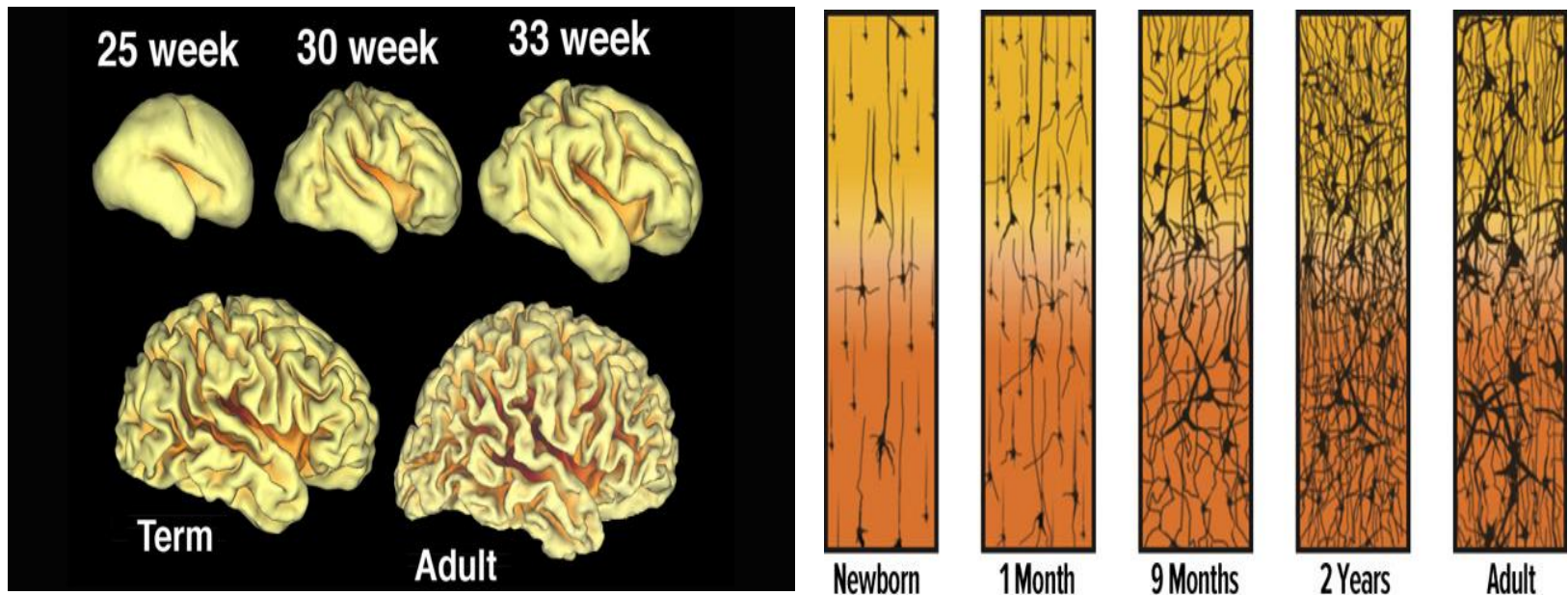


Various stages of brain development of a foetus

Stages of Brain Development in an Infant



Brain development



Role of unsaturated fatty acids

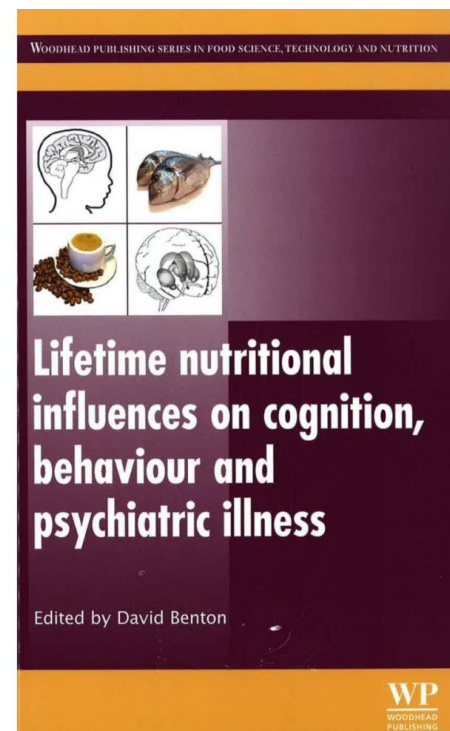
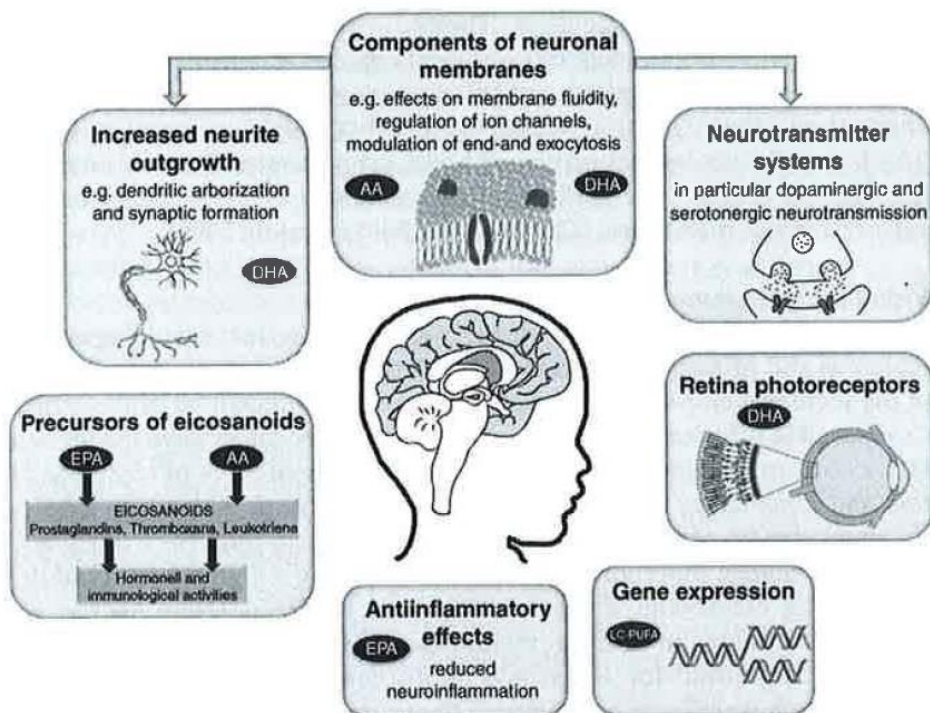


Fig. 2.2 Major effects of long-chain polyunsaturated fatty acids (LC-PUFAs) in brain.

Benton D, editor. Lifetime nutritional influences on cognition, behavior and psychiatric illness. Section 2.5.2. Effect of LC-PUFAs on neuronal mechanisms. Cambridge (UK): Woodhead Publishing; 2011. p. 38-41.

Fatty acid composition of plasma lipids in healthy Portuguese children: is the Mediterranean diet disappearing?

Abstract

BACKGROUND: Adults and children in Mediterranean countries are believed to consume a Mediterranean-type diet which is higher in monounsaturated and n-3 polyunsaturated fatty acids than compared to central and northern parts of Europe and has preventive effects for cardiovascular risks.

SUBJECTS AND METHODS: In preschool children from Porto, Portugal (n = 35) and Munich, Germany (n = 18) we determined the plasma phospholipid fatty acid composition considered as a biomarker for dietary fat intake.

RESULTS: The plasma phospholipid contents of total saturated fatty acids are similar in both groups, but the Portuguese children have lower values of monounsaturated and n-3 polyunsaturated fatty acids. The results indicate that the food habits of Portuguese children are even less close to the traditional Mediterranean diet than those of German children.

CONCLUSIONS: Efforts should be made to encourage young families as well as manufacturers and distributors of food products in Portugal to emphasize traditional Mediterranean food habits, especially in young children.

Healthy is often difficult

Low fish consumption = low **omega-3 fatty acids**



Recommended
amount:
40–100 g per week



DONALD Study:¹

Too little fish!!!

ONLY 38% eat fish

ONLY 10% among those eat
fatty sea fish

Content of omega-3 fatty acids in various fish species

GEHALT AN OMEGA-3-FETTSÄUREN (EPA/DHA) IN VERSCHIEDENEN FISCHEN

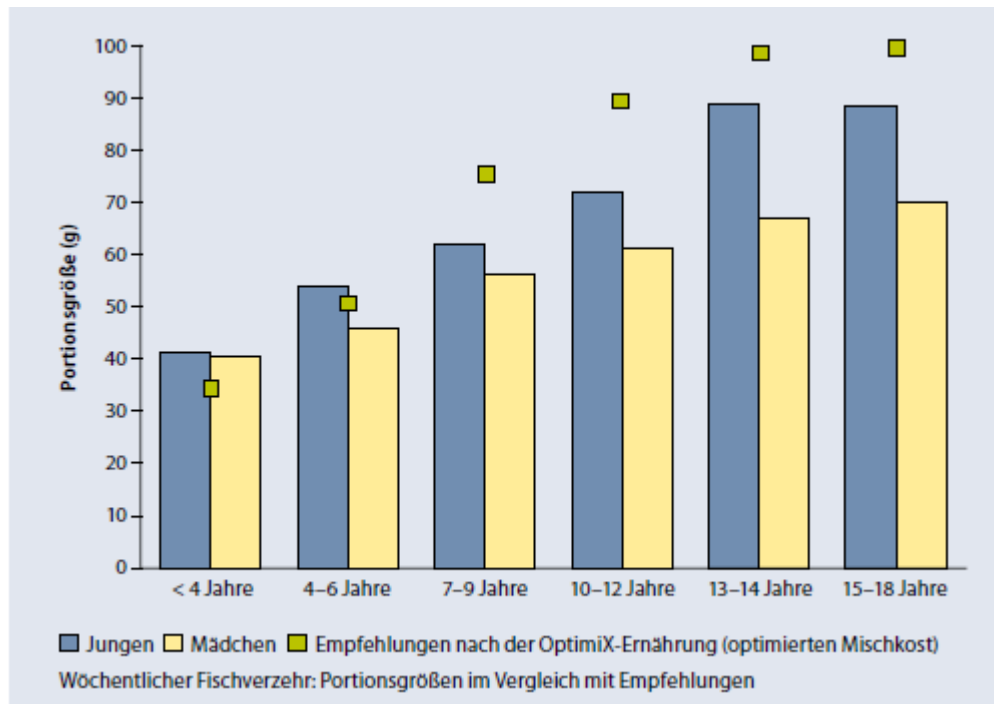
(Angaben in mg/100 g essbarer Anteil)

	EPA-Gehalt (in mg/100 g)*	DHA-Gehalt (in mg/100 g)*	EPA/DHA gesamt (in mg/100 g)*
Lachs	700	1.900	2.600
Hering	700	1.200	1.900
Makrele	700	1.100	1.800
Sardine	600	800	1.400
Forelle	140	500	640
Seelachs/ Köhler	100	340	440
Kabeljau/ Dorsch	70	190	260

* Die Werte unterliegen natürlichen Schwankungen.

Quelle: Soudi - Fachmann - Kraut (2008): Die Zusammensetzung der Lebensmittel – Nährwert-Tabellen. 7. revidierte und ergänzte Aufl., Wiss. Verlagsgesellschaft, Stuttgart (Zahlen gerundet)

Fish consumption of children and adolescents below recommendations



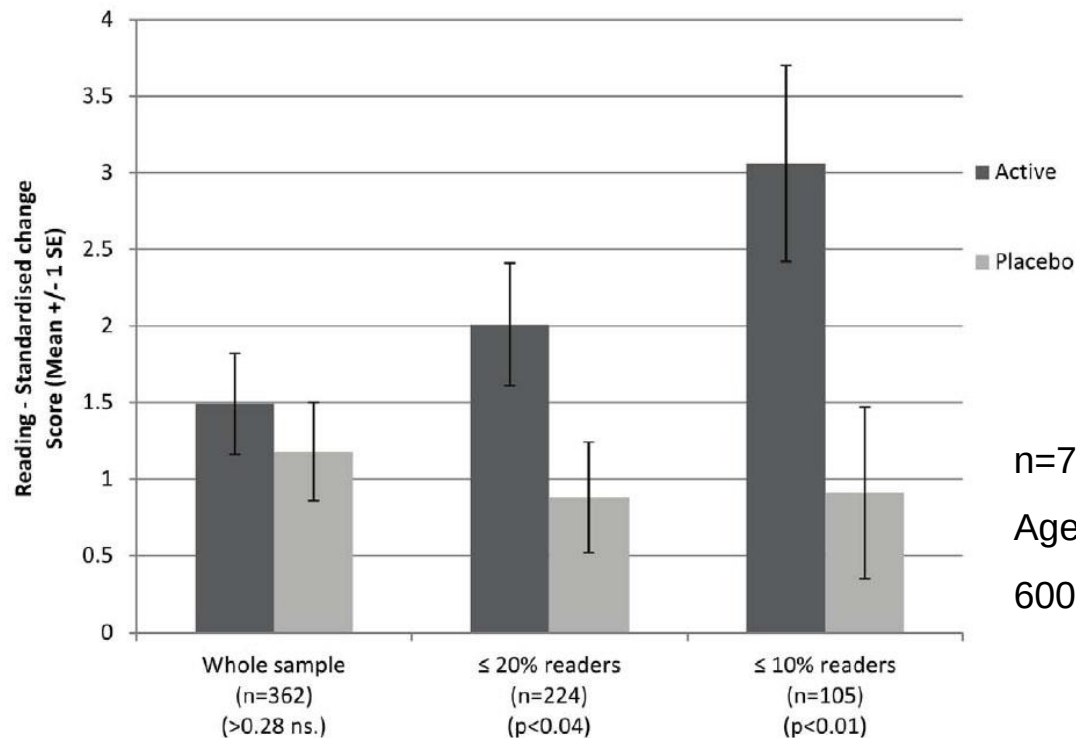
Served fish amounts per week range from 40 g (2–4 years) to 80 g (15–18 years), so the weekly consumption is below the recommended levels

Increased erythrocyte eicosapentaenoic acid and docosahexaenoic acid are associated with improved attention and behavior in children with ADHD in a randomized controlled three-way crossover trial

Abstract

Objective: To investigate effects of omega-3 polyunsaturated fatty acids (n-3 PUFA) docosahexaenoic acid (DHA) and eicosapentaenoic acid (EPA) on attention, literacy, and behavior in children with ADHD. **Method:** Ninety children were randomized to consume supplements high in EPA, DHA, or linoleic acid (control) for 4 months each in a crossover design. Erythrocyte fatty acids, attention, cognition, literacy, and Conners' Parent Rating Scales (CPRS) were measured at 0, 4, 8, 12 months. **Results:** Fifty-three children completed the treatment. Outcome measures showed no significant differences between the three treatments. However, in children with blood samples ($n = 76-46$), increased erythrocyte EPA + DHA was associated with improved spelling ($r = .365, p < .001$) and attention ($r = -.540, p < .001$) and reduced oppositional behavior ($r = -.301, p < .003$), hyperactivity ($r = -.310, p < .001$), cognitive problems ($r = -.326, p < .001$), *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.; DSM-IV) hyperactivity ($r = -.270, p = .002$) and DSM-IV inattention ($r = -.343, p < .001$). **Conclusion:** Increasing erythrocyte DHA and EPA via dietary supplementation may improve behavior, attention, and literacy in children with ADHD. (*J. of Att. Dis.* XXXX; XX(X) XX-XX)

Docosahexaenoic acid for reading, cognition and behavior in children aged 7-9 years: a randomized, controlled trial (the DOLAB study)



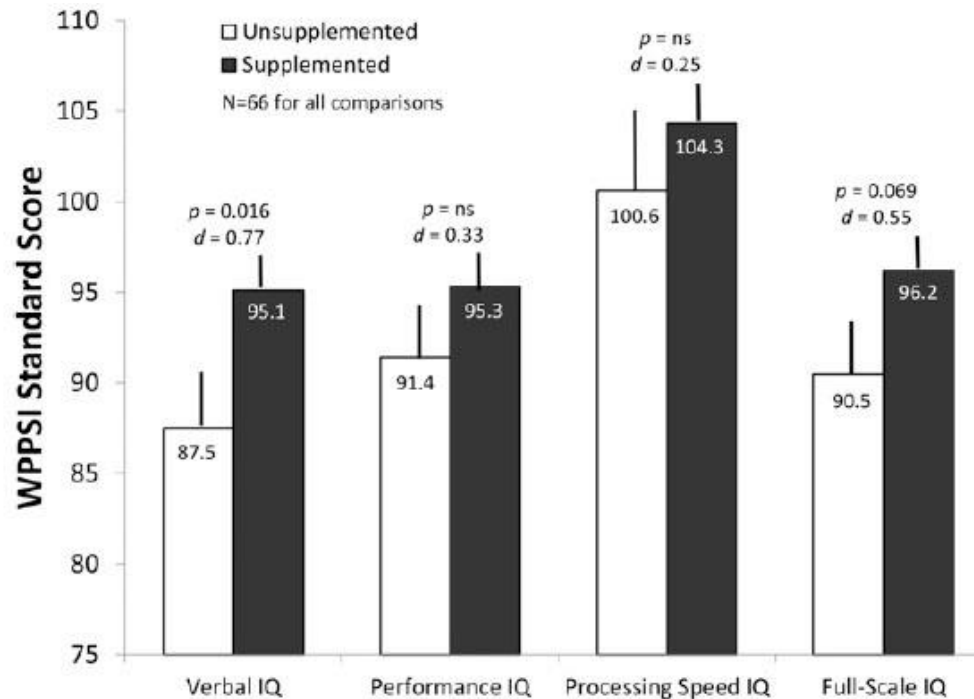
n=74

Age range: 7 to 9 years

600 mg DHA per day for 16 weeks

Figure 2. Change in reading scores between baseline and post-intervention.
doi:10.1371/journal.pone.0043909.g002

Long-term effects of LCPUFA supplementation on childhood cognitive outcomes



n=81 children

18 months to 6 years

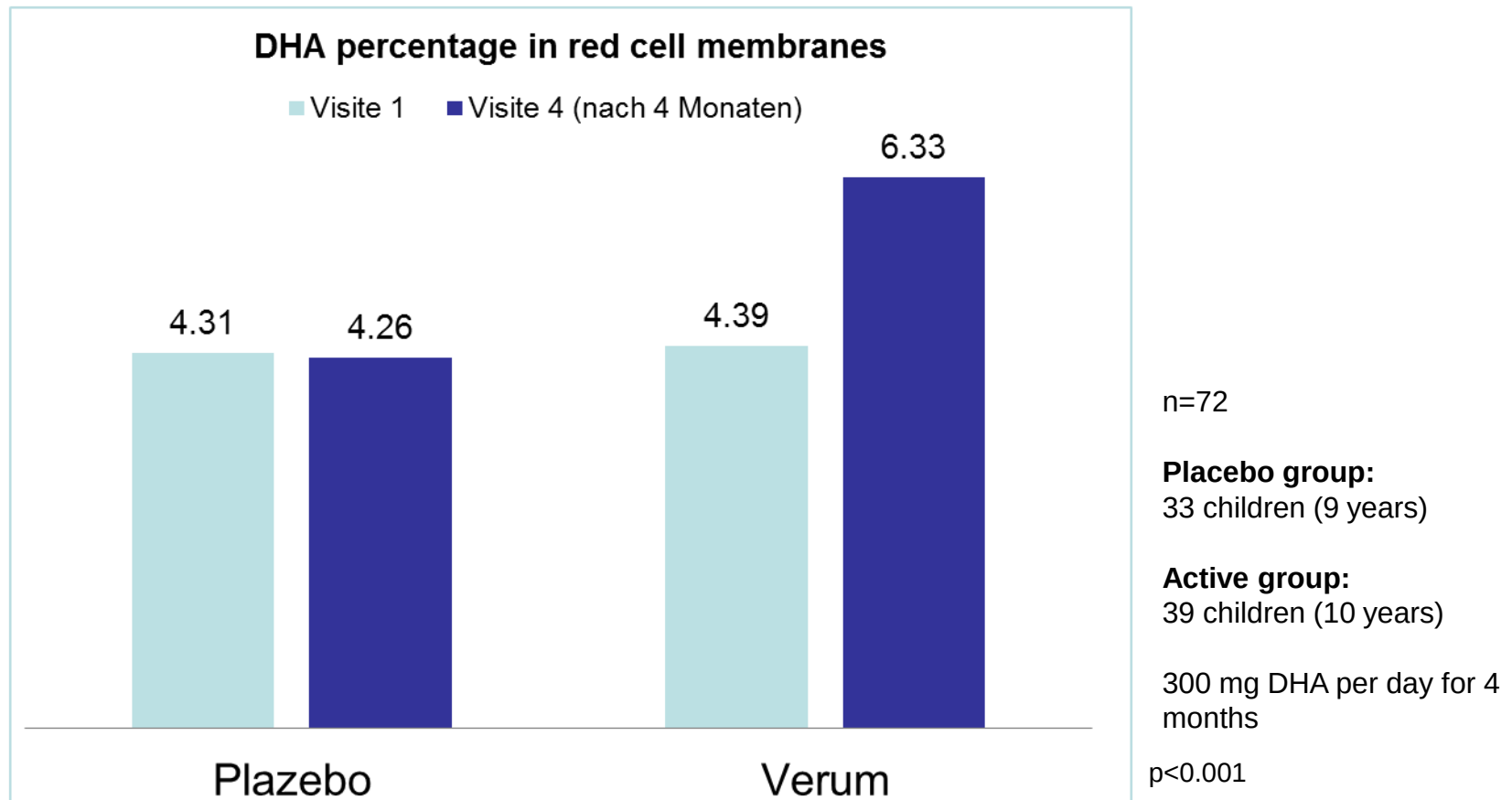
Placebo group n=19

PUFA group n=62

DHA (0.35%; 0.64%; 0.96%)
of total fatty acids

FIGURE 6. Mean ($\pm$ SE) WPPSI-III standard scores, adjusted for covariates, at age 6 y as a function of assignment to LCPUFA or control formula. Both ANOVA and ANCOVA analyses showed that infants who received the LCPUFA formula performed significantly better on the Verbal IQ subscale, and the differences were nearly significant for Full-Scale IQ. The numbers within the bars are means. The *P* values represent the results of ANCOVAs that compared values from the 3 LCPUFA groups (collapsed) with the control group; the *d* values represent the effect size for each comparison and were adjusted for covariates. IQ, intelligence quotient; LCPUFA, long-chain PUFA; WPPSI-III, Weschler Primary Preschool Scale of Intelligence, 3rd ed.

Good bioavailability of omega-3 fatty acids



Predecessor product with comparable omega-3 fatty acid composition. Data on file.

The effects of oral iron supplementation on cognition in older children and adults: a systematic review and meta-analysis

Abstract

Background: In observational studies anaemia and iron deficiency are associated with cognitive deficits, suggesting that iron supplementation may improve cognitive function. However, due to the potential for confounding by socio-economic status in observational studies, this needs to be verified in data from randomised controlled trials (RCTs).

Aim: To assess whether iron supplementation improved cognitive domains: concentration, intelligence, memory, psychomotor skills and scholastic achievement.

Methodology: Searches included MEDLINE, EMBASE, PsychINFO, Cochrane CENTRAL and bibliographies (to November 2008). Inclusion, data extraction and validity assessment were duplicated, and the meta-analysis used the standardised mean difference (SMD). Subgrouping, sensitivity analysis, assessment of publication bias and heterogeneity were employed.

Results: Fourteen RCTs of children aged 6+, adolescents and women were included; no RCTs in men or older people were found. Iron supplementation improved attention and concentration irrespective of baseline iron status (SMD 0.59, 95% CI 0.29 to 0.90) without heterogeneity. In anaemic groups supplementation improved intelligence quotient (IQ) by 2.5 points (95% CI 1.24 to 3.76), but had no effect on non-anaemic participants, or on memory, psychomotor skills or scholastic achievement. However, the funnel plot suggested modest publication bias. The limited number of included studies were generally small, short and methodologically weak.

Conclusions: There was some evidence that iron supplementation improved attention, concentration and IQ, but this requires confirmation with well-powered, blinded, independently funded RCTs of at least one year's duration in different age groups including children, adolescents, adults and older people, and across all levels of baseline iron status.

Iron contributes to the normal cognitive development

SCIENTIFIC OPINION

Scientific Opinion on the Substantiation of a health claim related to Iron and cognitive development of children pursuant to Article 14 of Regulation (EC) No 1924/2006¹

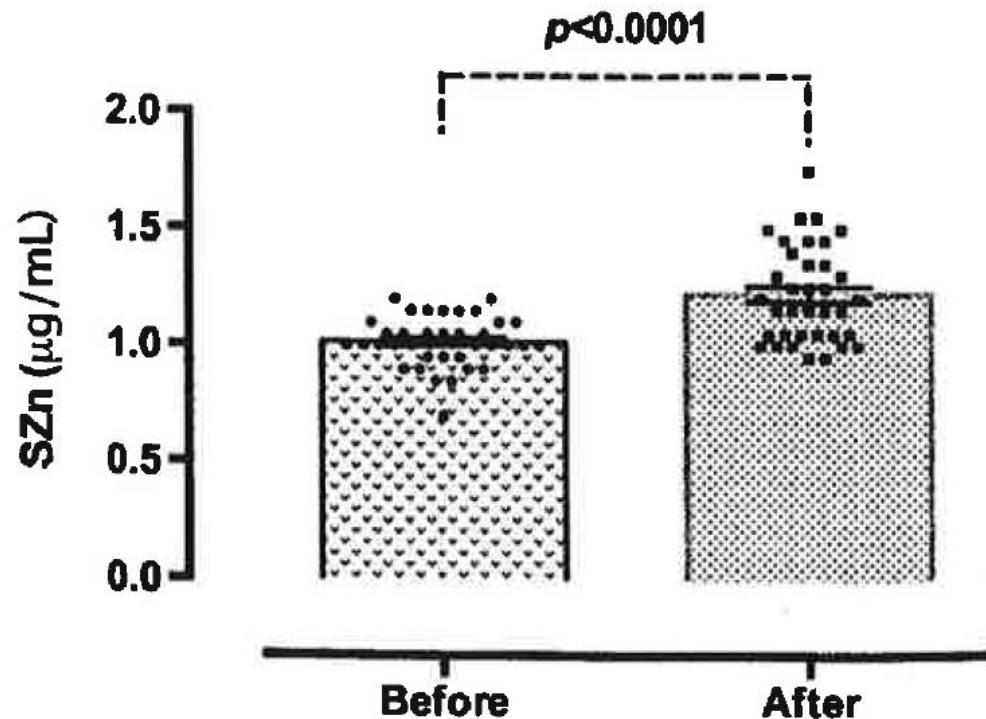
EFSA Panel on Dietetic Products, Nutrition and Allergies (NDA)^{2,3}

European Food Safety Authority (EFSA), Parma, Italy



- The claimed effect proposed by the applicant is “important for the cognitive development of infants and young children”. The target population proposed by the applicant is “infants and young children from birth to three years of age”. Contribution to normal cognitive development is a beneficial physiological effect for infants and young children.
- A cause and effect relationship has been established between dietary intake of iron and contribution to normal cognitive development.
- The following wording reflects the scientific evidence: “Iron contributes to normal cognitive development”.

Oral zinc supplementation may improve cognitive function in schoolchildren



n=36

Mean age: 7.9 years

Zinc supplementation:

Zinc 5 mg per day for 3 months

Fig. 2 Serum zinc levels (SZn) before and after oral zinc supplementation. Values are expressed as minimums, medians, and maximums. All comparisons were conducted using a 5 % level of significance (paired Student's *t* test)

Effect of a 12-mo micronutrient intervention on learning and memory in well-nourished and marginally nourished school-aged children: 2 parallel, randomized, placebo-controlled studies in Australia and Indonesia

TABLE 1
Composition of the intervention products¹

Nutrient	Concentration in intervention product	RDI, Australia (8–11 y)	RDA, Indonesia (7–9 y)
Iron as NaFeEDTA	10 mg	6–8 mg	10 mg
Zinc as zinc sulfate	5 mg	9 mg	10 mg
Vitamin A as retinol acetate	400 µg RE	500 µg RE	400 µg RE
Folate	150 µg	150 µg	80 µg
Vitamin B-6	1 mg	1.5 mg	1.0 mg
Vitamin B-12	1.5 µg	1.5 µg	0.9 µg
Vitamin C	45 mg	30 mg	45 mg
DHA	88 mg	NA	NA
EPA	22 mg	NA	NA

¹ DHA, docosahexaenoic acid; EPA, eicosapentaenoic acid; NA, not available; RDI, Recommended Daily Intake; RDA, Recommended Dietary Allowance (16).

Australia n=396 children (8 to 11years)

Indonesia n=384 children(6 to 10 years)

Micronutrient-fortified beverage

Effect of a 12-mo micronutrient intervention on learning and memory in well-nourished and marginally nourished school-aged children: 2 parallel, randomized, placebo-controlled studies in Australia and Indonesia

NEMO Nutrition Enhancement for Mental Optimization



Conclusion: In well-nourished school-aged children, fortification with multiple micronutrients can result in improvements in verbal learning and memory.

Orthomol® junior Omega plus: Main ingredients

Important ingredients	Nutritional features and functional characteristics
Omega-3 fatty acids	• component of the nerve cell membrane • important for the signal transmission (neurotransmitter)
Iron	• important for normal cognitive development
Magnesium and B vitamins	• important for the nerve cells metabolism
Vitamin C, vitamin E and zinc	• important for the protection of cells from oxidative stress

Orthomol® junior Omega plus is a food supplement for children. It contains iron to help normal cognitive development in children, plus omega-3 fatty acids, zinc and B vitamins.

Thank you for listening!

