

Systematic review of the effect of nutrition, diet and dietary change on learning, education and performance of children of relevance to UK schools



Project Team

Dr Louisa Ells
Miss Frances Hillier
Prof Janet Shucksmith
Prof Carolyn Summerbell



Advisory Group

Dr Helen Crawley (Nutrition expert – Kingston University)
Dr Laurence Harbige (Biochemistry expert – University of Greenwich)
Dr Julian Hamilton Shield (Paediatric expert – University of Bristol)
Dr Andy Wiggins (Educational expert – University of Durham)

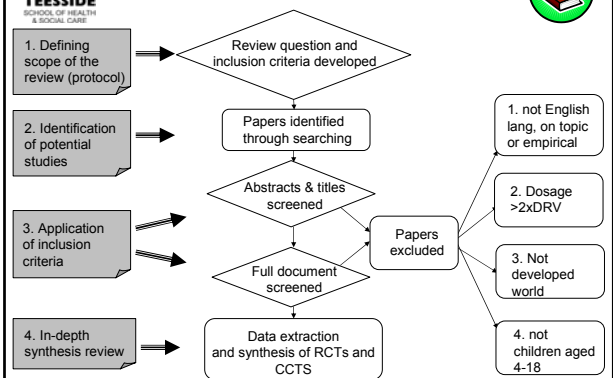


Review Aims

To identify and synthesise primary research undertaken to evaluate the effect of nutrition, diet and dietary change on learning, education and performance of school aged children (aged 4-18 years) in the developed world.



Review Methods



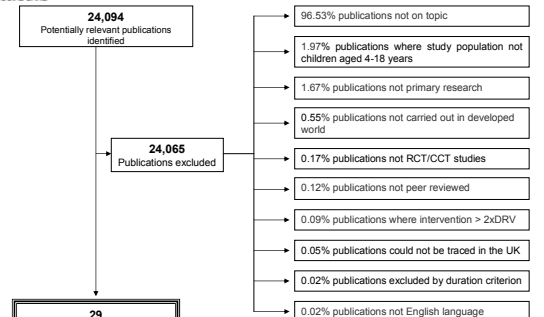
Review Inclusion Criteria



- Studies reporting primary research (Randomised Controlled Trials, Case Control Trials and Cluster Control Trials)
- Studies examining 'achievable diets' i.e. with a dosage of no more than 2x DRV
- Studies focusing on healthy children of compulsory school age – i.e. aged 4 -18 years
- Studies written in English
- Studies undertaken in the developed world (using World Bank HDI criteria)
- Studies undertaken in any setting
- Studies from start dates of databases searched (1966 – Dec 2005)

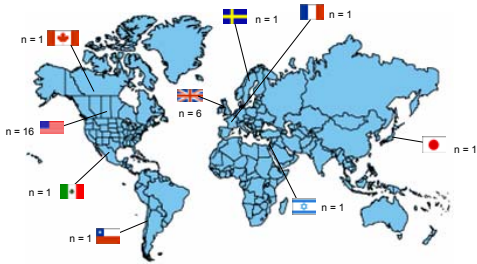


Study Breakdown

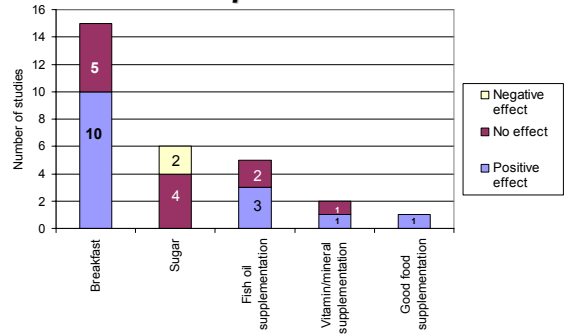


* Sum of percentages exceeds 100% as some publications met more than one exclusion criteria

Geographical Spread



Data Extraction: Grouped Studies



Key Results: Fish oil studies



- 5 studies examined the effect of fish oil supplementation in a population aged 5-13 years with symptoms of neurodevelopmental disorders (dyspraxia or ADHD)
- All 5 studies were carried out in last 5 years and used a placebo controlled study design
- Good quality studies: 2 from UK, 2 from US, and 1 from Japan
- Study samples were small (n 40-117)
- Studies lasted between 2 and 4 months

Key Results: Fish oil studies



1. Voigt et al 2001 (US)
 2. Richardson et al 2002 (UK)
 3. Stevens et al 2003 (US)
 4. Hirayama et al 2004 (Japan)
 5. Richardson & Montgomery 2005 (UK)
- Only the 2 US studies measured blood biochemistry alongside objective testing and subjective parental and teacher observations.

Key Results: Fish oil studies



- Both US and UK studies used fish oil capsules; Japanese study incorporated test oil into pre-prepared food and drink
- The fatty acid composition used differed by study, with 4 out of 5 studies using a mixture rich in DHA. The other study (Richardson 2005) used a mixture rich in EPA, and it contained GLA

DHA = Docosahexaenoic acid

EPA = Eicosapentaenoic acid

GLA = Gamma-linolenic acid

Key Results: Fish oil studies



- Despite increases in blood concentrations of long chain n-3 fatty acids in the treatment groups, **Voigt** found no significant differences in behavioural and educational outcomes between the treatment and control groups.
- **Stevens** detected a small improvement in just 2 out of 16 subjective parental and teacher observations, although blood fatty acid concentrations were shown to correlate significantly with these observations.

Key Results: Fish oil studies



- Of the remaining three studies, **Richardson, 2002** showed a small statistically significant improvement in 3 out of 14 subjective parental behaviour scores in the fish oil group.
- **Hirayama** found no significant difference between treatment and placebo groups, apart from a small significant improvement in continuous performance and visual short term memory in the control group only.

Key Results: Fish oil studies



- The most recent **Richardson, 2005** study was the only study to report consistent significant improvements in both objective and subjective behavioural and educational outcomes assessed in the EPA rich treatment group.

Summary of Findings: Fish oil studies



- Findings were mixed and therefore inconclusive
- Only the most recent study (Richardson 2005) reported consistent significant improvements in both objective and subjective behavioural and educational outcomes.
- Caution when translating evidence of effect from children with neurodevelopmental disorders to otherwise healthy children.
- Dosages in supplements given in trials are unlikely to be achieved through diet alone. Optimal dose is unclear.

Conclusion



- The current evidence base for the effect of fish oil supplementation on learning, education and performance remains inconclusive
- *Further research needed in countries of relevance to UK, high quality, represent all populations, undertaken for longer duration, and use universal standardised measures of educational attainment*
- Whilst importance of diet in educational attainment is unclear, evidence for promoting a diet low in fat, salt and refined sugar but high in fruits, vegetables and complex carbohydrates, remains unequivocal in terms of health outcomes for all school children