

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



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## Advisory Group

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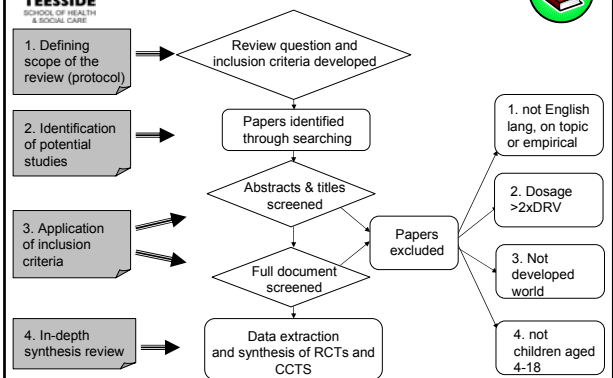


## Review Aims

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



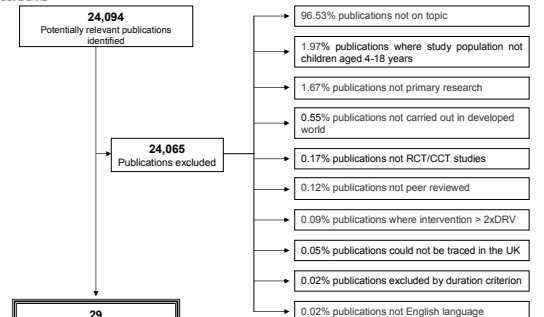
## Review Inclusion Criteria



- 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)

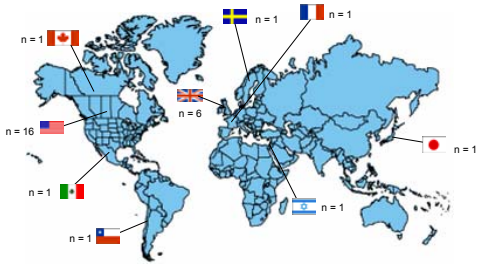


## Study Breakdown

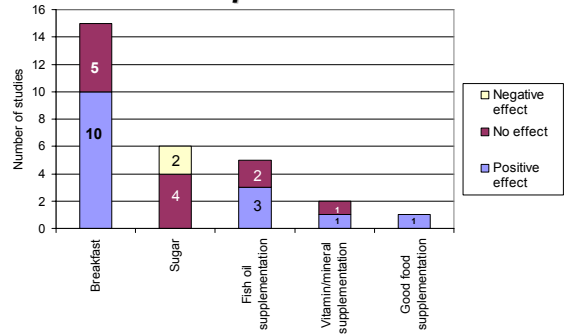


\* Sum of percentages exceeds 100% as some publications met more than one exclusion criteria

## 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