

Essential fats and cardiovascular health in children

Olli Simell

Essential fats and child development

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Special Turku Coronary Risk factor Intervention Project for Children STRIP

**Research Centre of Applied and
Preventive Cardiovascular Medicine
Department of Pediatrics
Department of Medicine
University of Turku**



- **Prospective**
- **Randomized**
- **Continuous**
- **Life-style intervention**
- **Onset in infancy**

Background

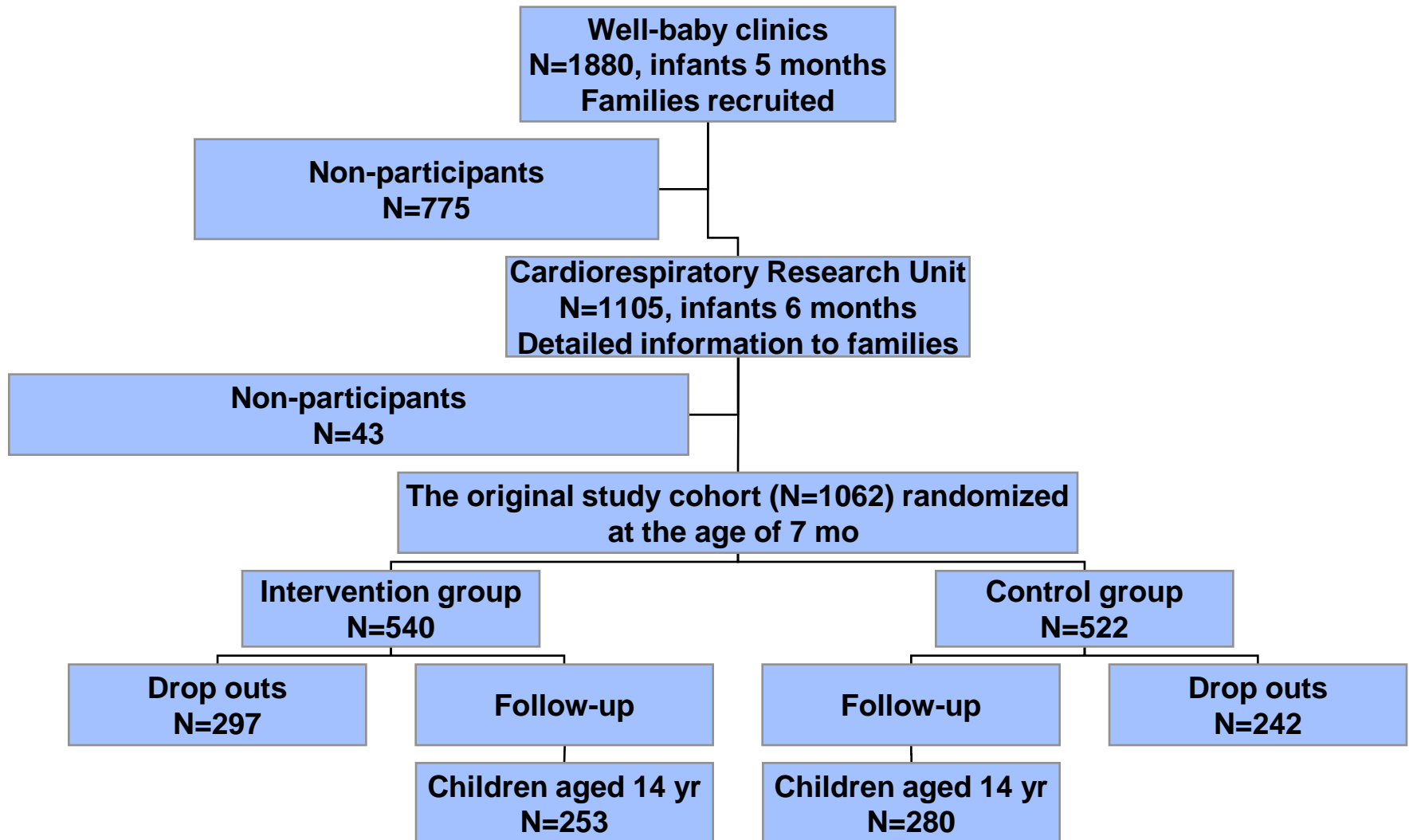
- 1. Coronary heart disease is a major health problem in Western countries**
- 2. CHD mortality in Finnish men is among the highest in the world**
- 3. Finnish children have high serum cholesterol concentration**
- 4. Atherosclerosis begins in early childhood**
- 5. The risk factors of CHD are well known**
- 6. Most of the risk factors are based on the way of living**



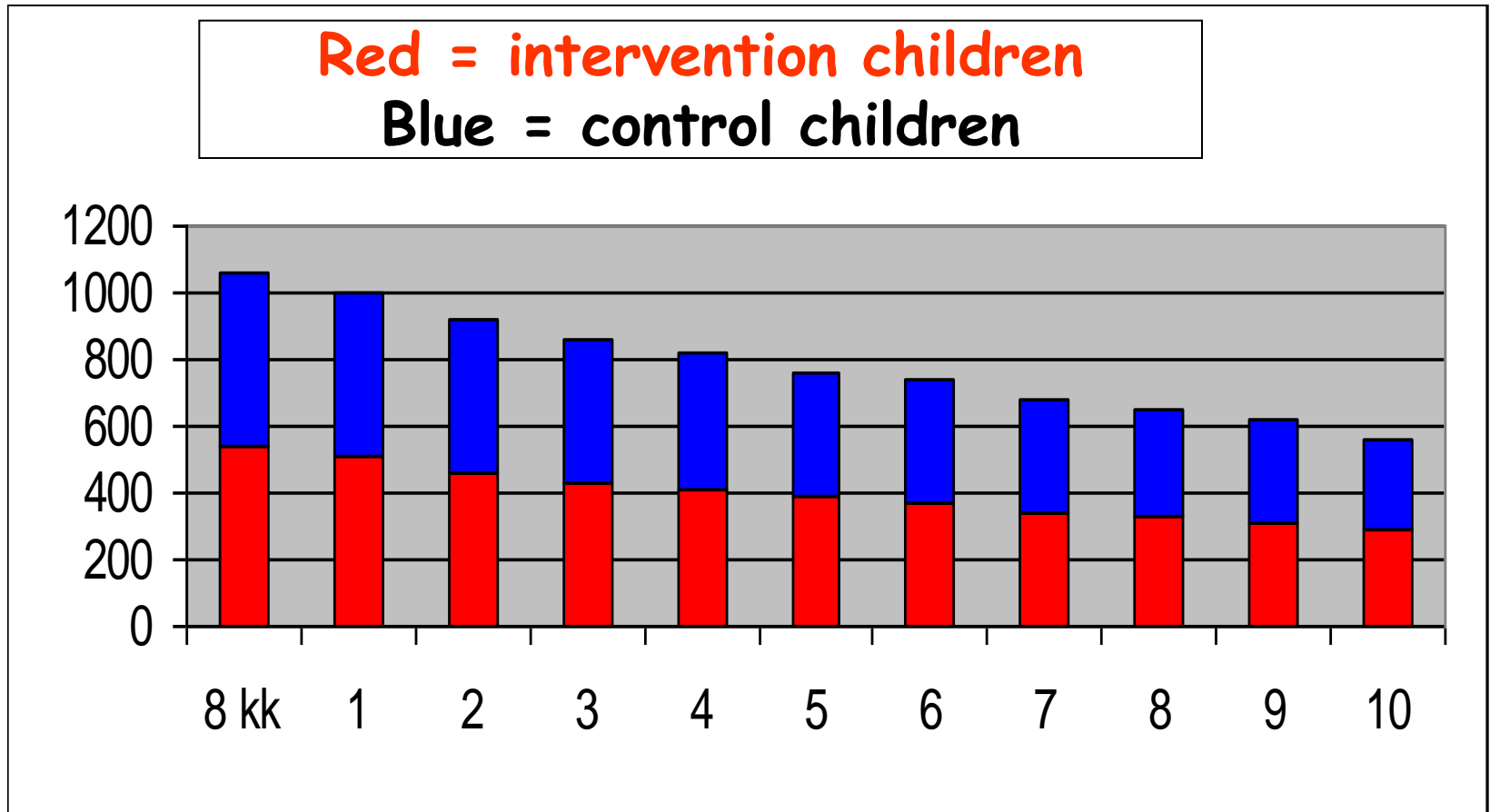
We investigate

- ♥ whether it is possible to decrease the amount of CHD risk factors by using individualized counseling starting in early childhood
- ♥ the arterial wall structure and function of children using non-invasive ultrasound method
- ♥ whether the child-based intervention changes the levels of risk factors of the parents
- ♥ the growth and development of obesity in the intervention and control children

The flow-chart of the STRIP project



Drop out rates



Methods

- ♥ Food records, dietary recalls
- ♥ S-cholesterol, apolipoproteins etc.. once a year
- ♥ Children: clinical examination, blood pressure, weight and height twice a year
- ♥ Parents: blood pressure, weight once a year
- ♥ Neuro(psycho)logical development
- ♥ Ultrasound measurements
- ♥ Bone density measurements
- ♥ etc.

Study visits



♥ Intervention group

- ♥ 1 to 3-month interval until child age of 2 years, biannually thereafter

♥ Control group:

- ♥ 6-month intervals until child's age of 7 years, thereafter once a year

♥ Counseling team:

- ♥ Medical doctor
- ♥ Nutritionist
- ♥ Nurse
- ♥ Laboratory nurse

Dietary goals



♥ Based on NNR

♥ → The results of the study have later been used when the recommendations have been updated

♥ Energy without restrictions

♥ Fat:

♥ 30-35E% (13mo-2y),

♥ 30E% (3y→)

♥ Carbohydrates 50-60E%, Protein 10-15E%

♥ Unsaturated to saturated fatty-acid ratio 2:1

♥ **Main aim to reduce the intake of saturated fat**

Dietary counselling



- ♥ Regularly (biannually) given
 - ♥ 7 mo-7y to the parents
 - ♥ 7.5y → separate sessions for the parents and the children
- ♥ Implementation individualised
 - ♥ A fixed diet never ordered
- ♥ Based on 4-day food records and eating habits of the family
- ♥ Changes made step by step
 - ♥ Everyday choices most important

Practical dietary goals

- ♥ **Breastfeeding as long as mothers felt it practical**
(app. 12 months)
 - ♥ if necessary commercial cow milk-based formula
- ♥ **Skim milk from 12 months of age**
 - + 2-3 teaspoons of vegetable oil daily up to the age of 2 yr
- ♥ **Detailed suggestions to replace products containing large amounts of saturated fat with unsaturated fat**
 - ♥ Cream → vegetable fat cream
 - ♥ Use of margarines/oils in food preparation, baking and bread spread
 - ♥ Lean milk- and meat products
- ♥ **Ample use of vegetables, fruits and berries and whole-grain products**
- ♥ **Use of fish regularly**

Prospective randomised trial in 1062 infants of diet low in saturated fat and cholesterol

Helena Lapinleimu, Jorma Viikari, Eero Jokinen, Pia Salo, Taina Routi, Aila Leino, Tapani Rönnemaa, Ritva Seppänen, Ilkka Välimäki, Olli Simell

Summary

Interventions to avoid atherosclerosis might be more successful if launched early in life when eating and lifestyle patterns are formed, but dietary interventions have been limited by fears of diet-induced growth failure. We investigated the effects of a diet low in saturated fat and cholesterol on serum lipid concentrations and growth in 1062 healthy 7-month-old infants in a randomised study.

Every 1–3 months, families in the intervention group received dietary advice aimed at adequate energy supply, with low fat intake (30–35% energy, polyunsaturated/monounsaturated/saturated fatty acid ratio 1/1/1, and cholesterol intake <200 mg daily). Infants in control families consumed an unrestricted diet. 3-day food records were collected at ages 8 and 13 months. Growth was carefully monitored. Between 7 and 13 months serum cholesterol and non-high-density-lipoprotein cholesterol concentrations did not change significantly in the intervention group (mean change -0.03 [SD 0.72] mmol/L and 0.01 [0.67] mmol/L) but increased substantially in the

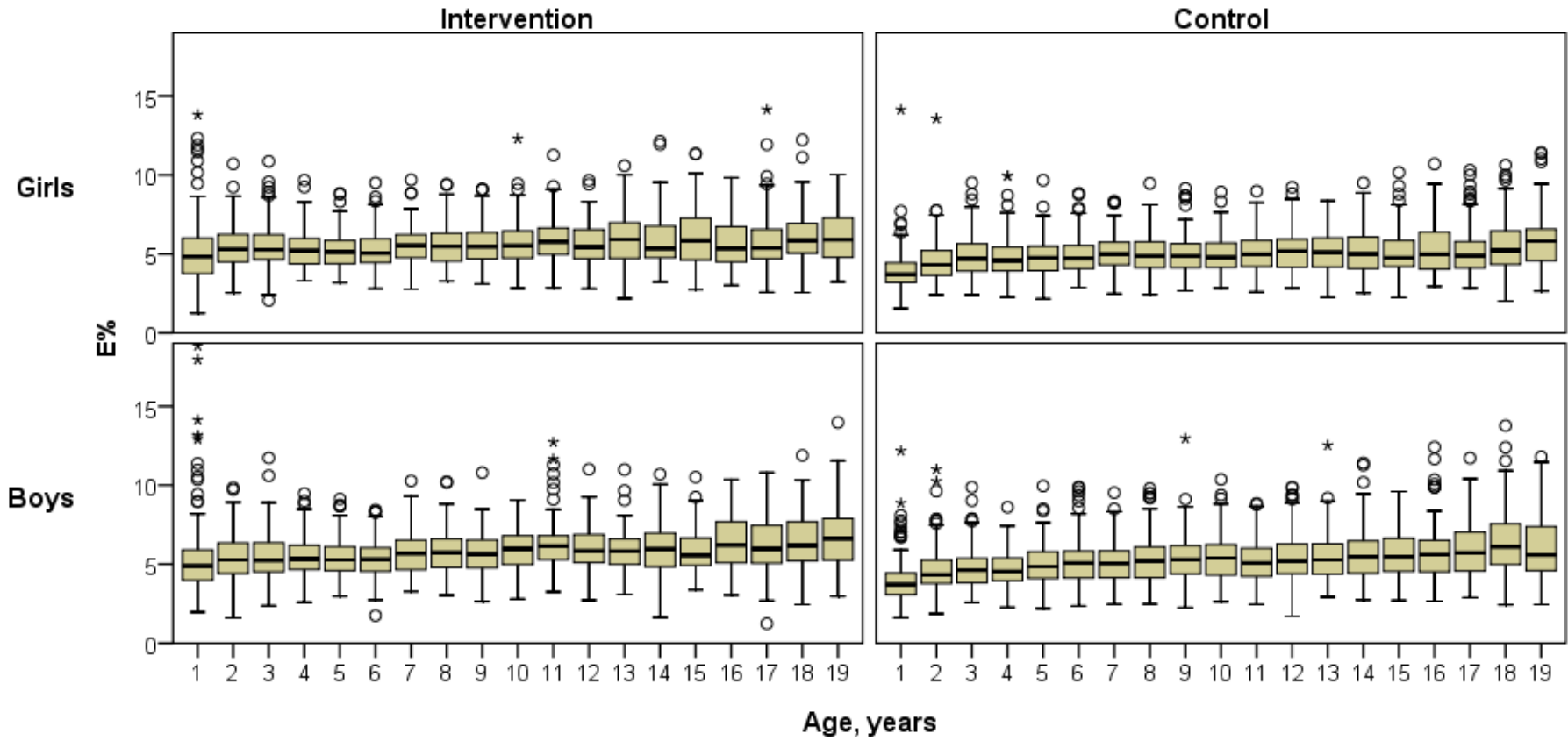
control group (0.24 [0.64] mmol/L and 0.23 [0.60] mmol/L; p for difference in mean changes between groups <0.001). Daily intakes of energy and saturated fat were lower in the intervention than in the control group at 13 months (4065 [796] vs 4370 [748] kJ, $p=0.033$, and 9.3 [3.5] vs 14.5 [4.8] g, $p<0.001$, respectively), and intake of polyunsaturated fat was higher (5.8 [2.2] vs 4.4 [1.4] g, $p<0.001$). Growth did not differ between the groups and was as expected for children at this age. Serum cholesterol concentrations fell significantly in parents of intervention-group infants.

The increases in serum cholesterol and non-high-density-lipoprotein cholesterol concentration that occur in infants between the ages of 7 and 13 months can be avoided by individualised diets, with no effect on the children's growth.

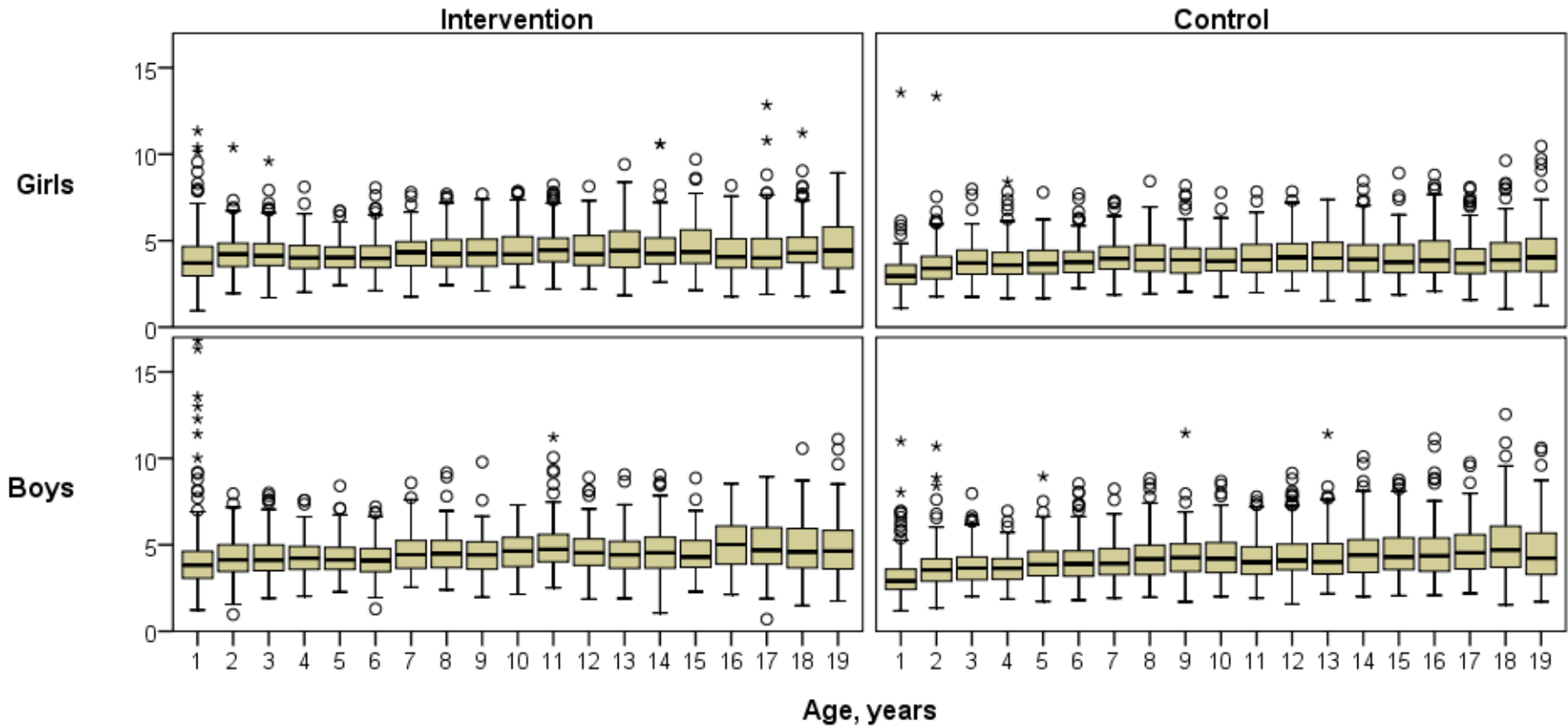
Lancet 1995; **345**: 471–76

See Commentary page 468

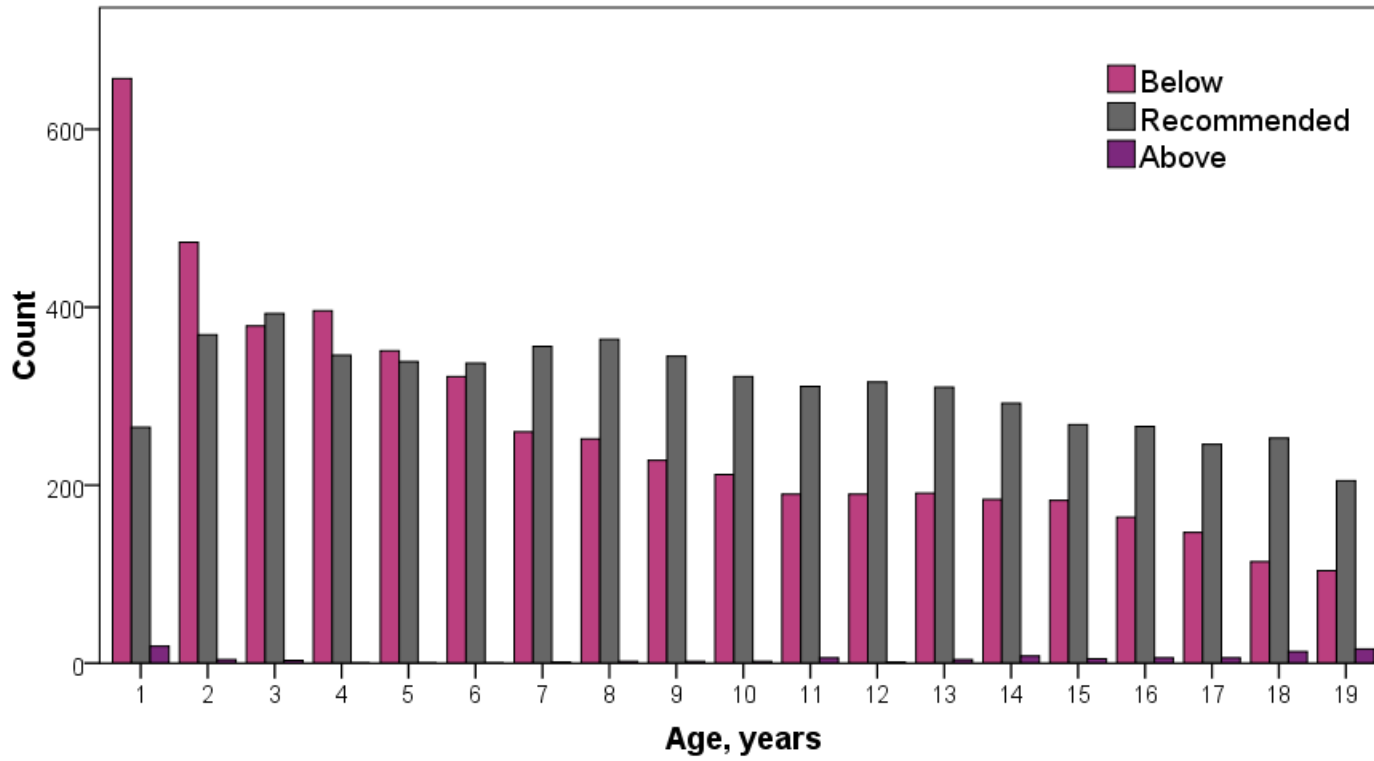
PUFA, E%



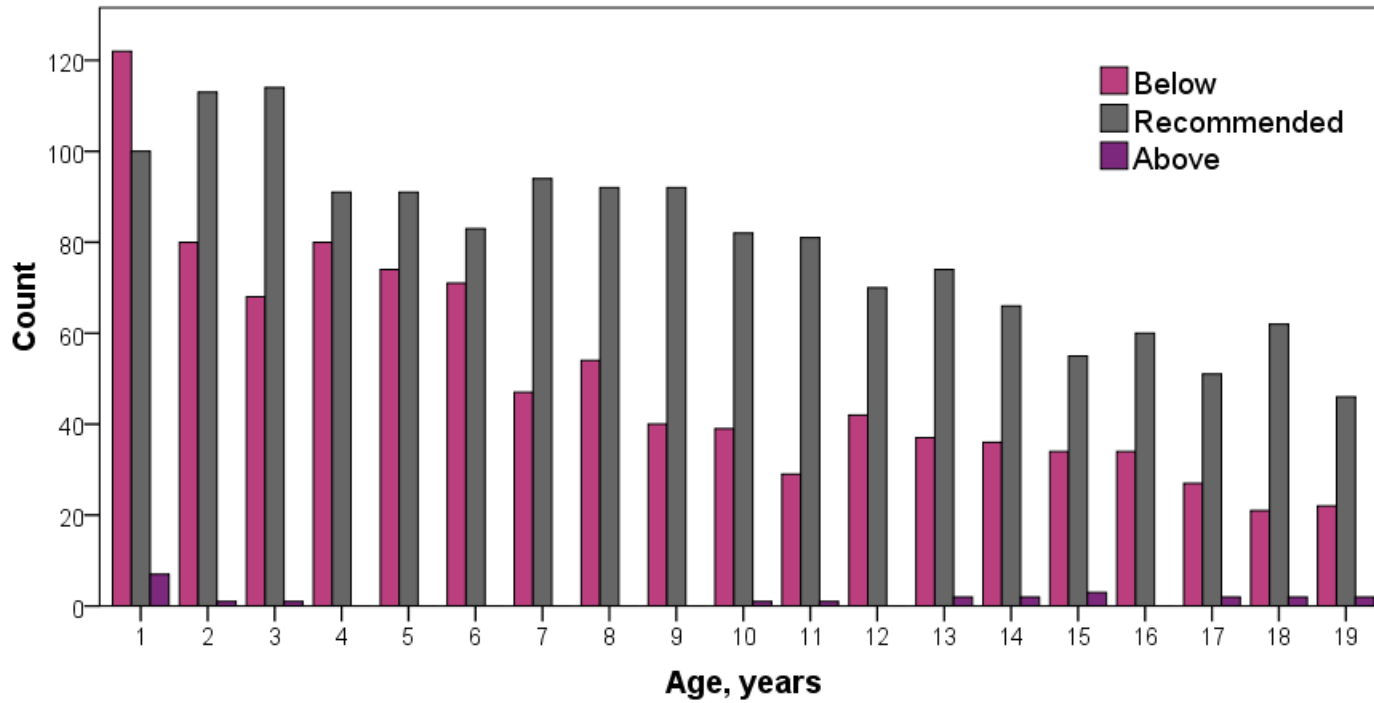
C18:2 Linoleic acid, E%



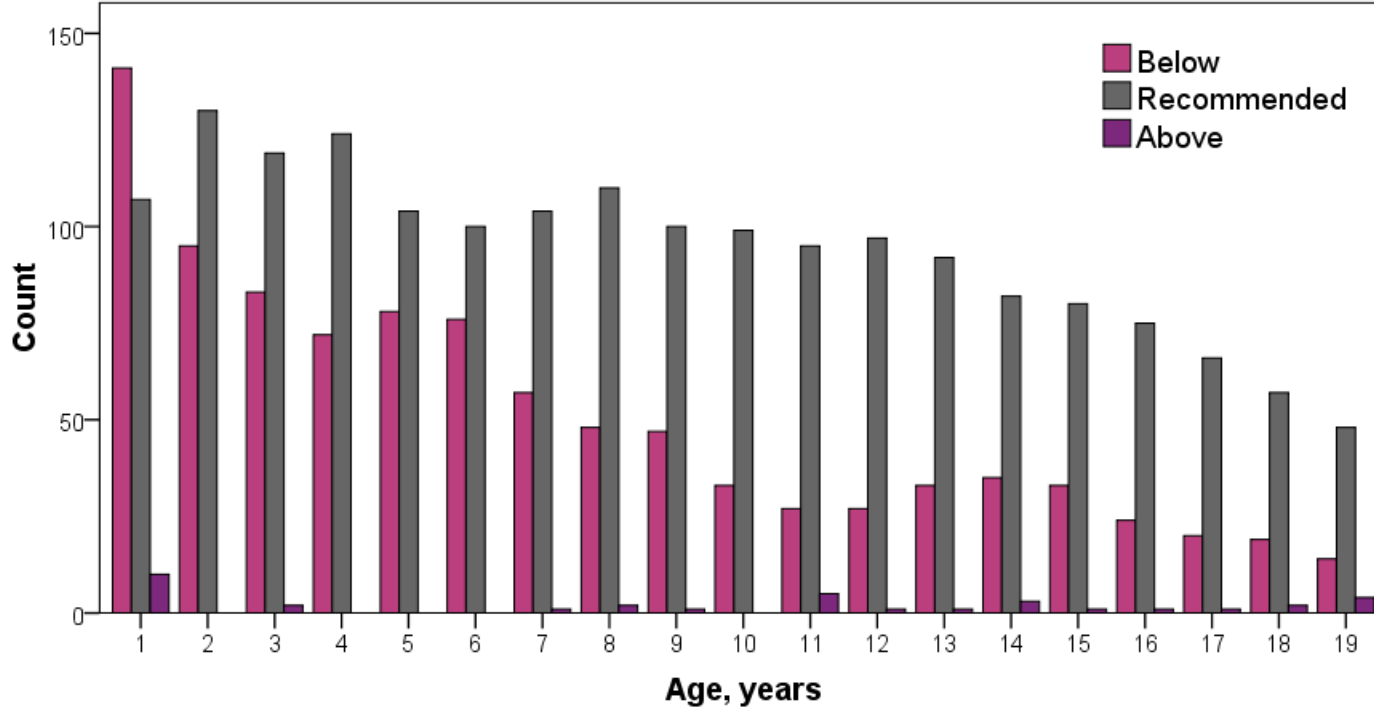
PUFA, Recommended intake (5-10 E%)



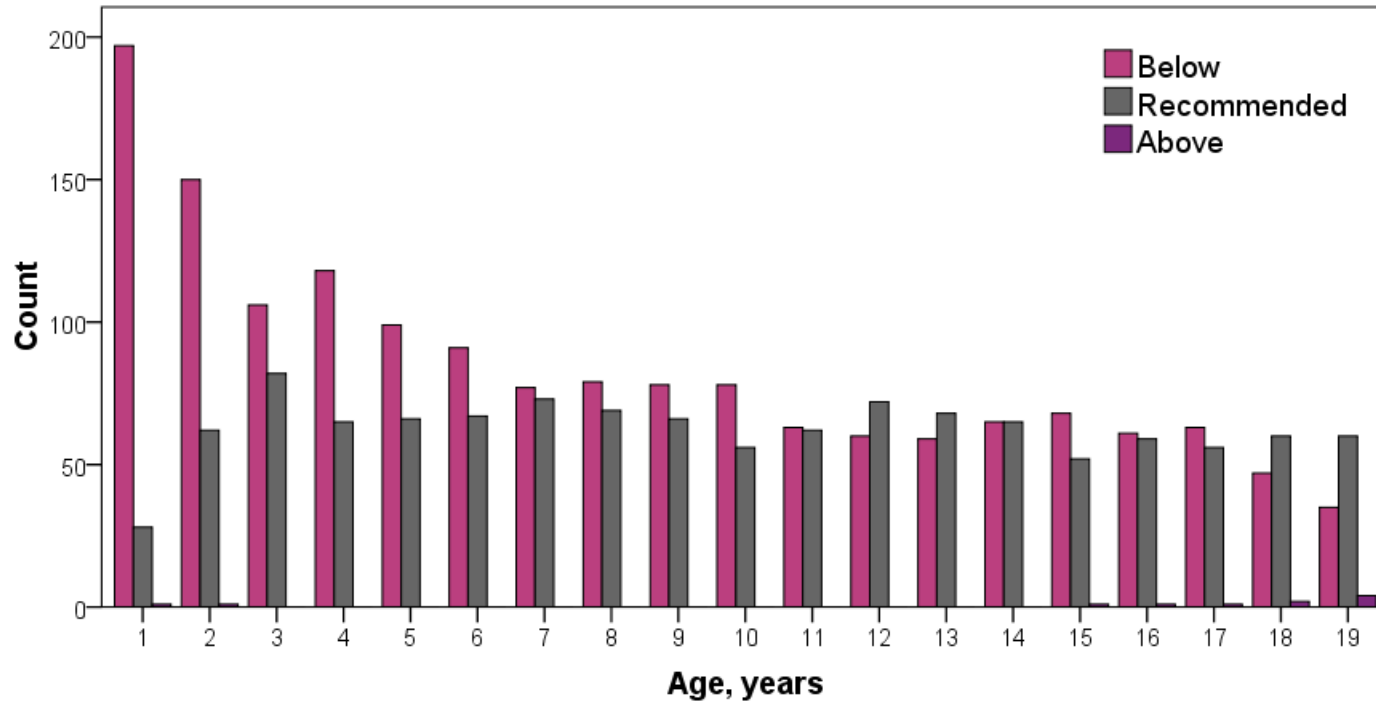
PUFA, Recommended intake (5-10 E%): Intervention girls



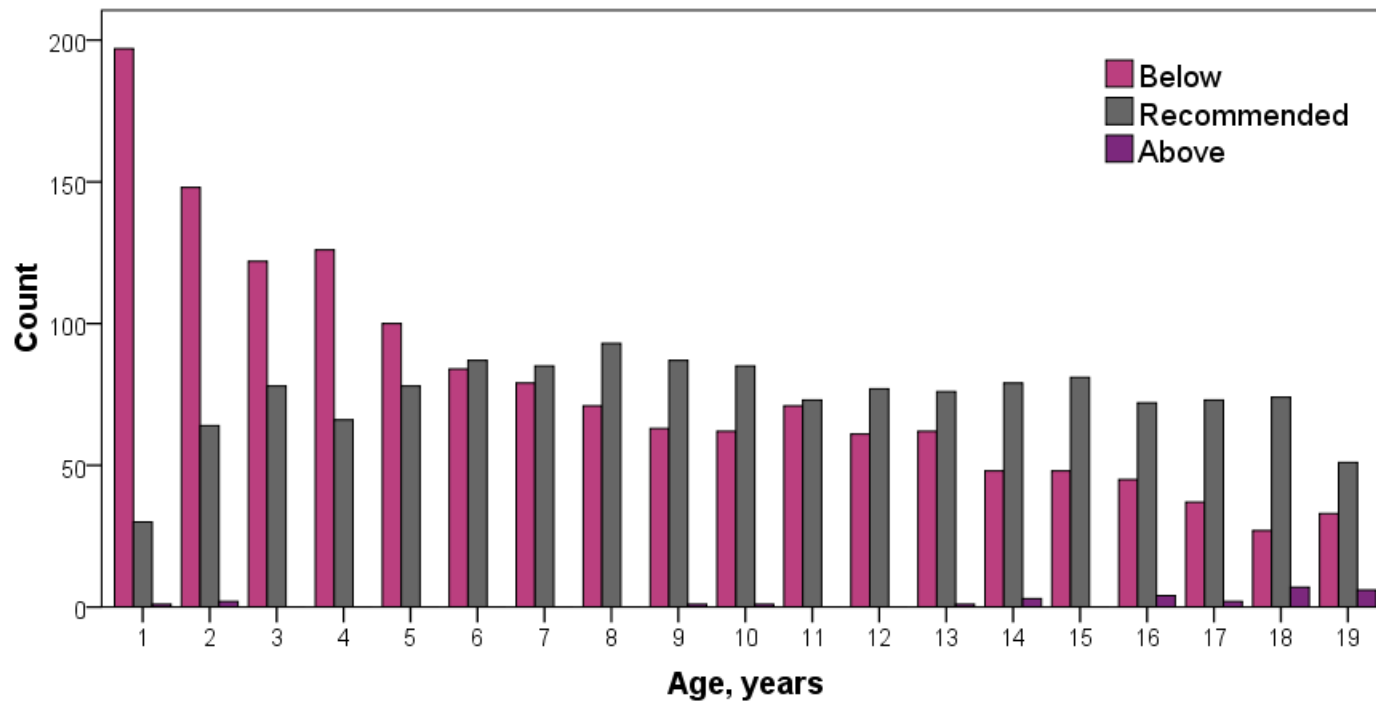
PUFA, Recommended intake (5-10 E%): Intervention boys



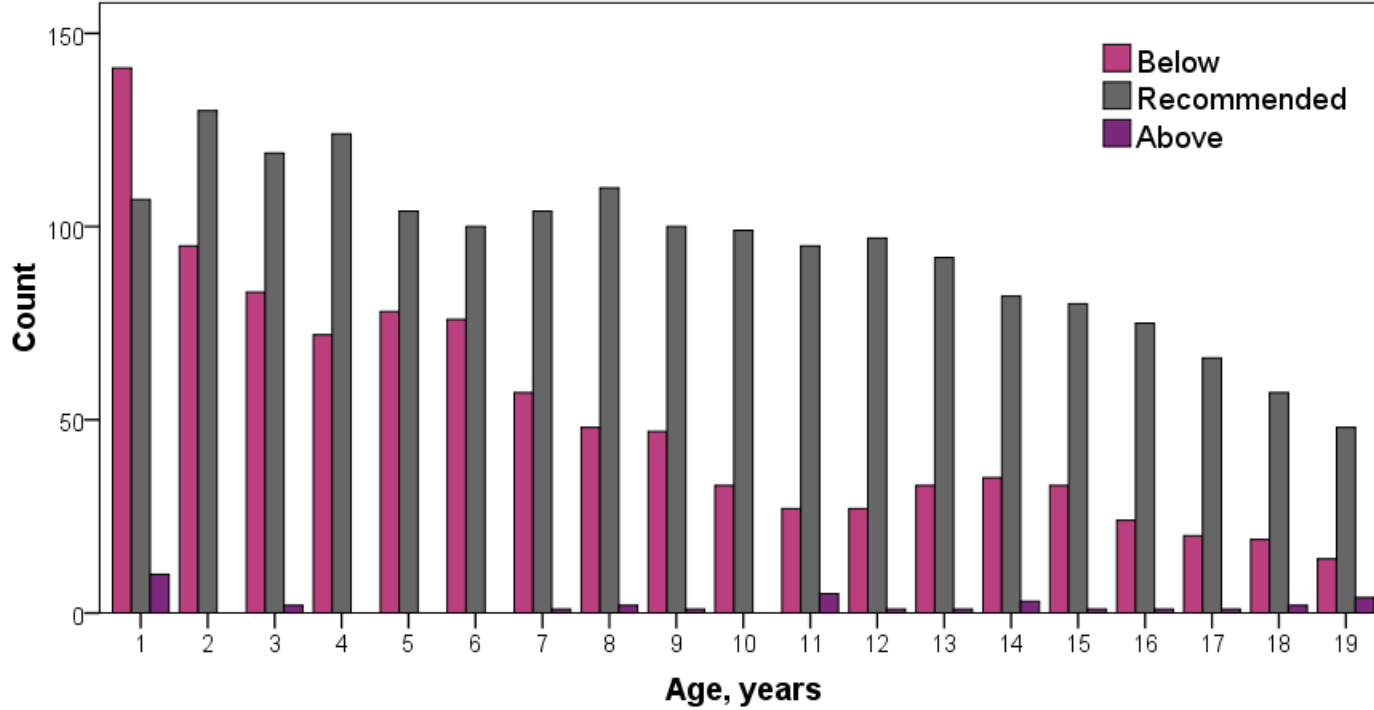
PUFA, Recommended intake (5-10 E%): Control girls



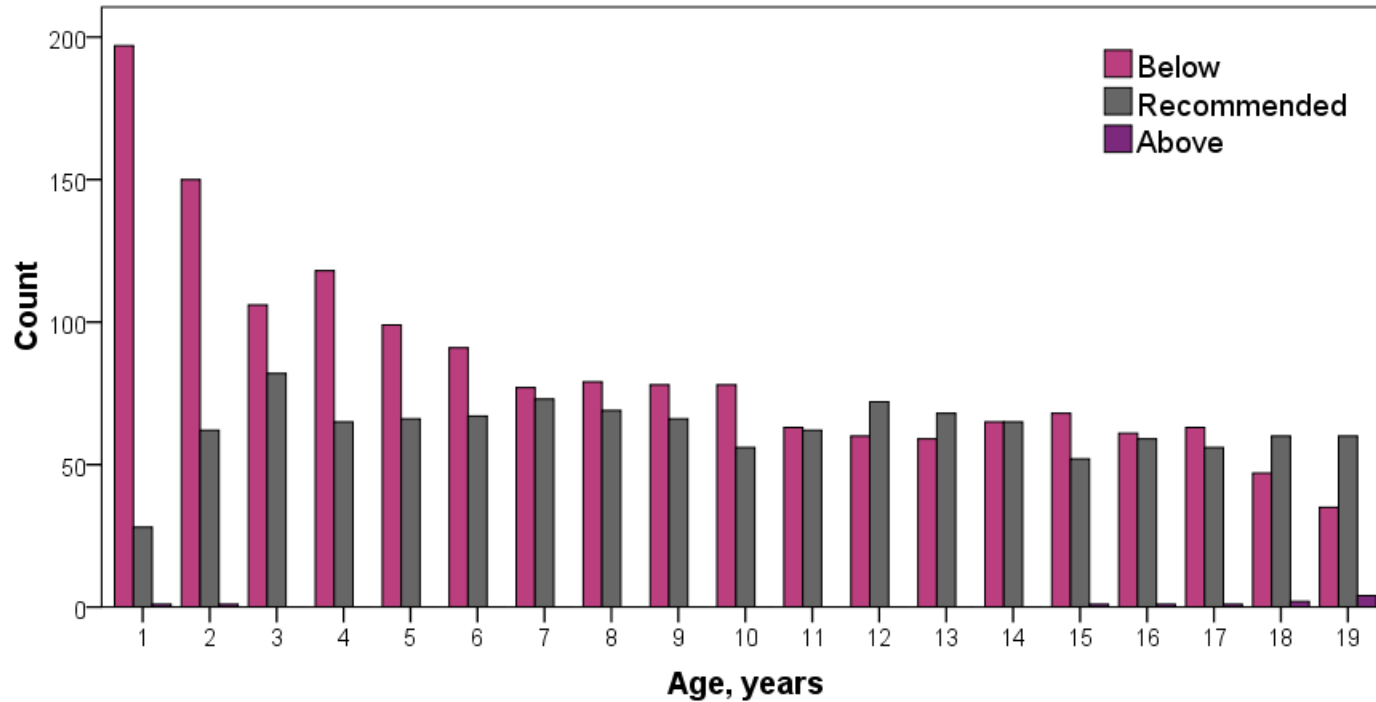
PUFA, Recommended intake (5-10 E%): Control boys



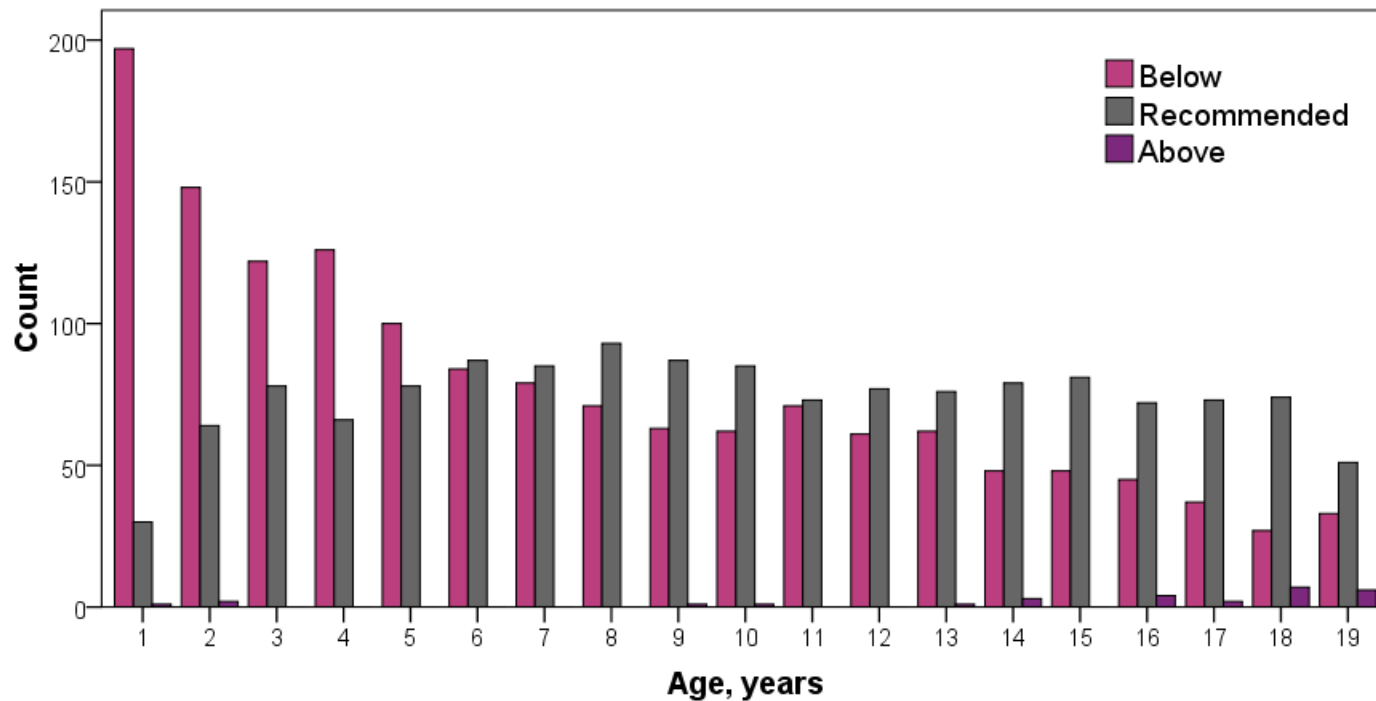
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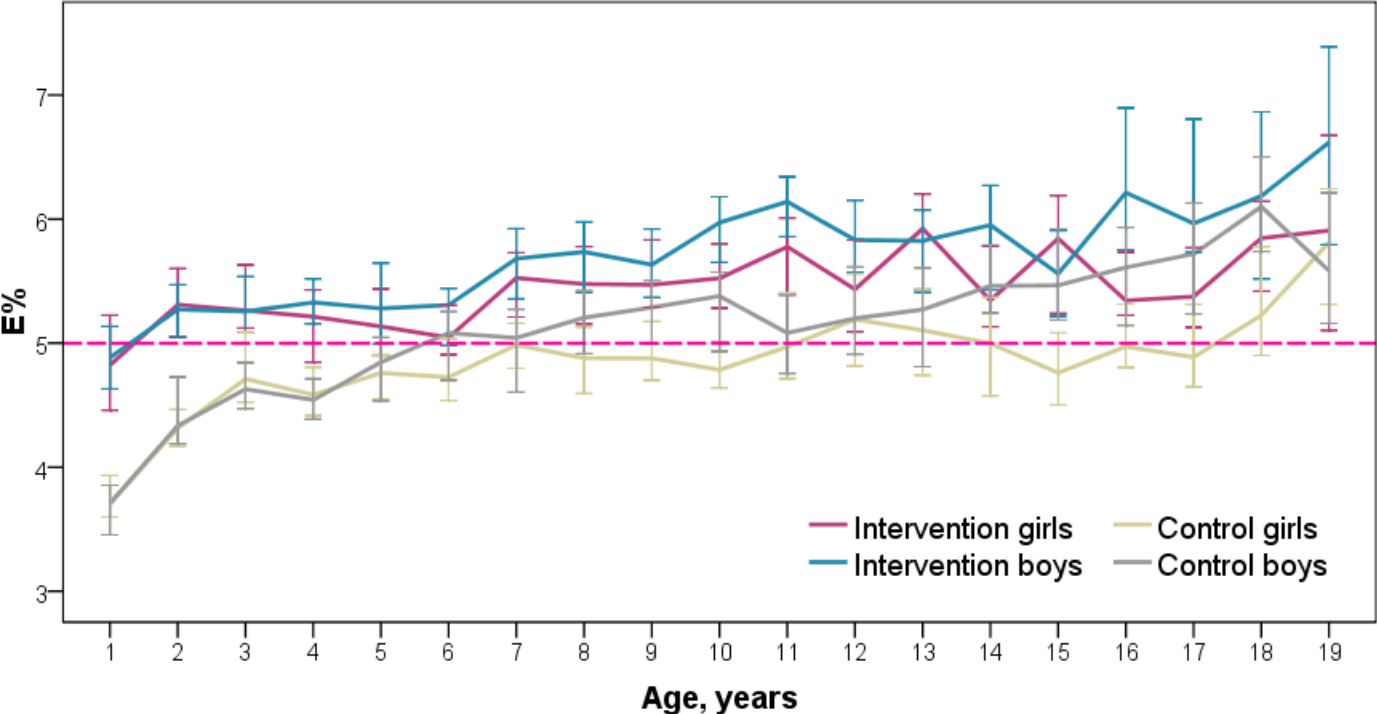
PUFA, Recommended intake (5-10 E%): Control girls



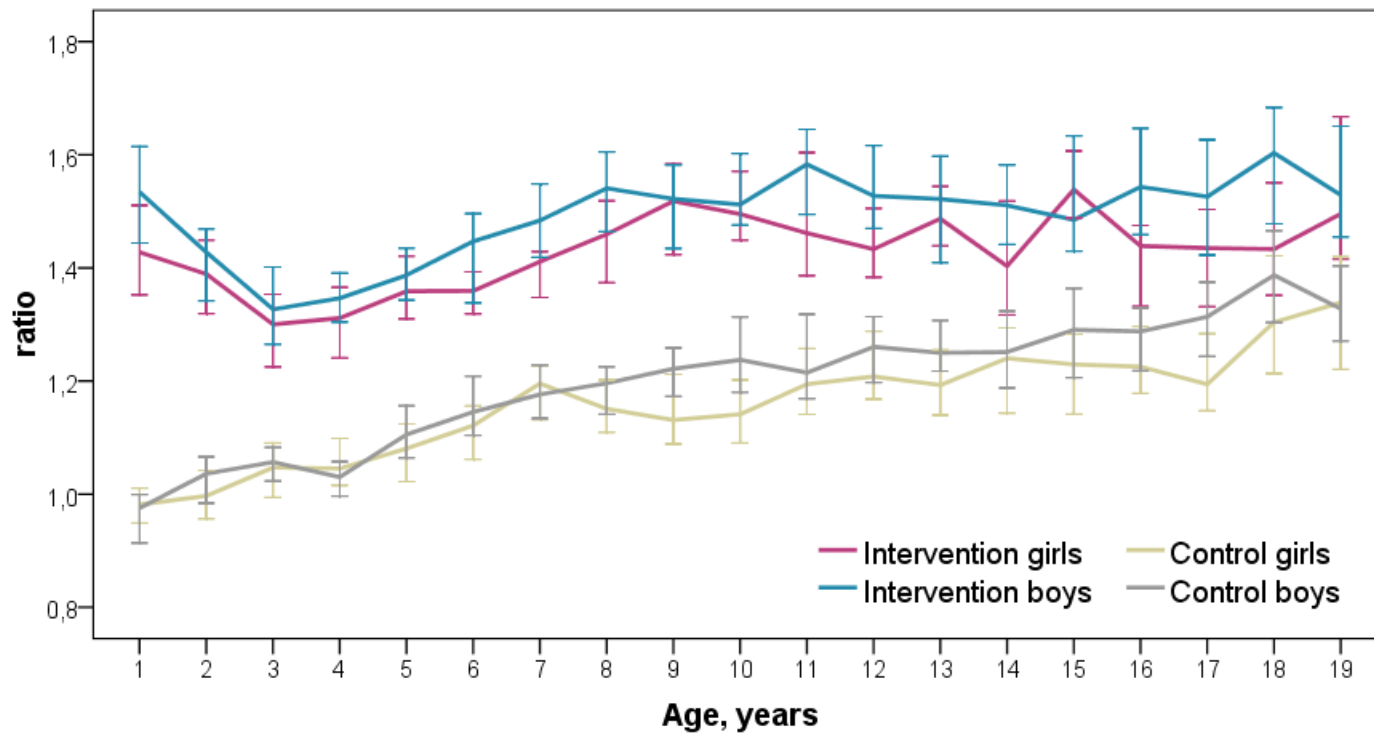
PUFA, Recommended intake (5-10 E%): Control boys



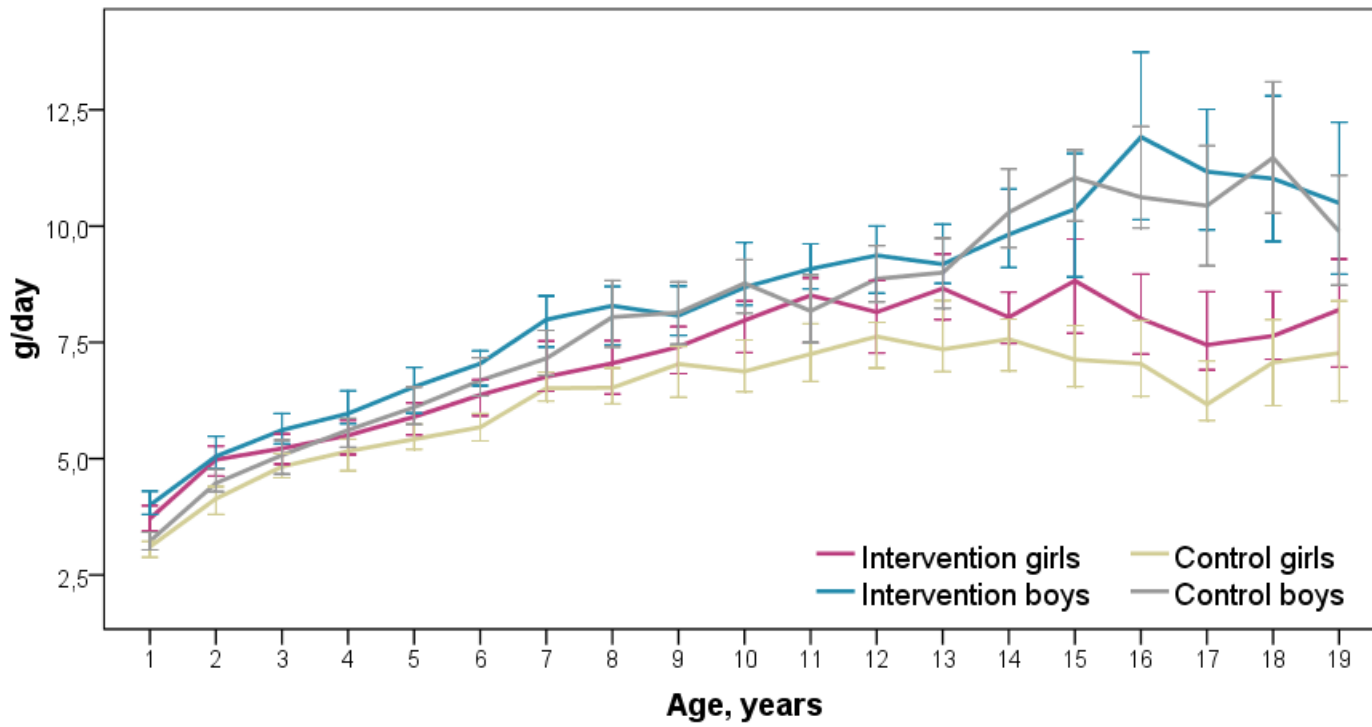
PUFA, median (95%CI)



(P+M)/S ratio, median (95%CI)



C18:2 Linoleic acid, median (95%CI)



C18:3 Linolenic acid, median (95%CI)

