



Blood Omega-3 Concentrations Are Associated With Reading, Working Memory And Behaviour In Healthy Children Aged 7-9 Years.



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Introduction

This novel study assessed the relationship between blood fatty acids and reading, working memory, behaviour and health in a large sample of school-children. It was conducted as part of the DOLAB (DHA Oxford Learning and Behaviour) Trial.

Objective epidemiological evidence of LC-PUFA status in children is limited. Furthermore, studies with such data reporting learning and behaviour outcomes are scarce.

This large study reports robust measures of blood fatty acid concentrations, learning and behaviour in a representative sample of mainstream UK children for the first time.

Study Description

Procedure

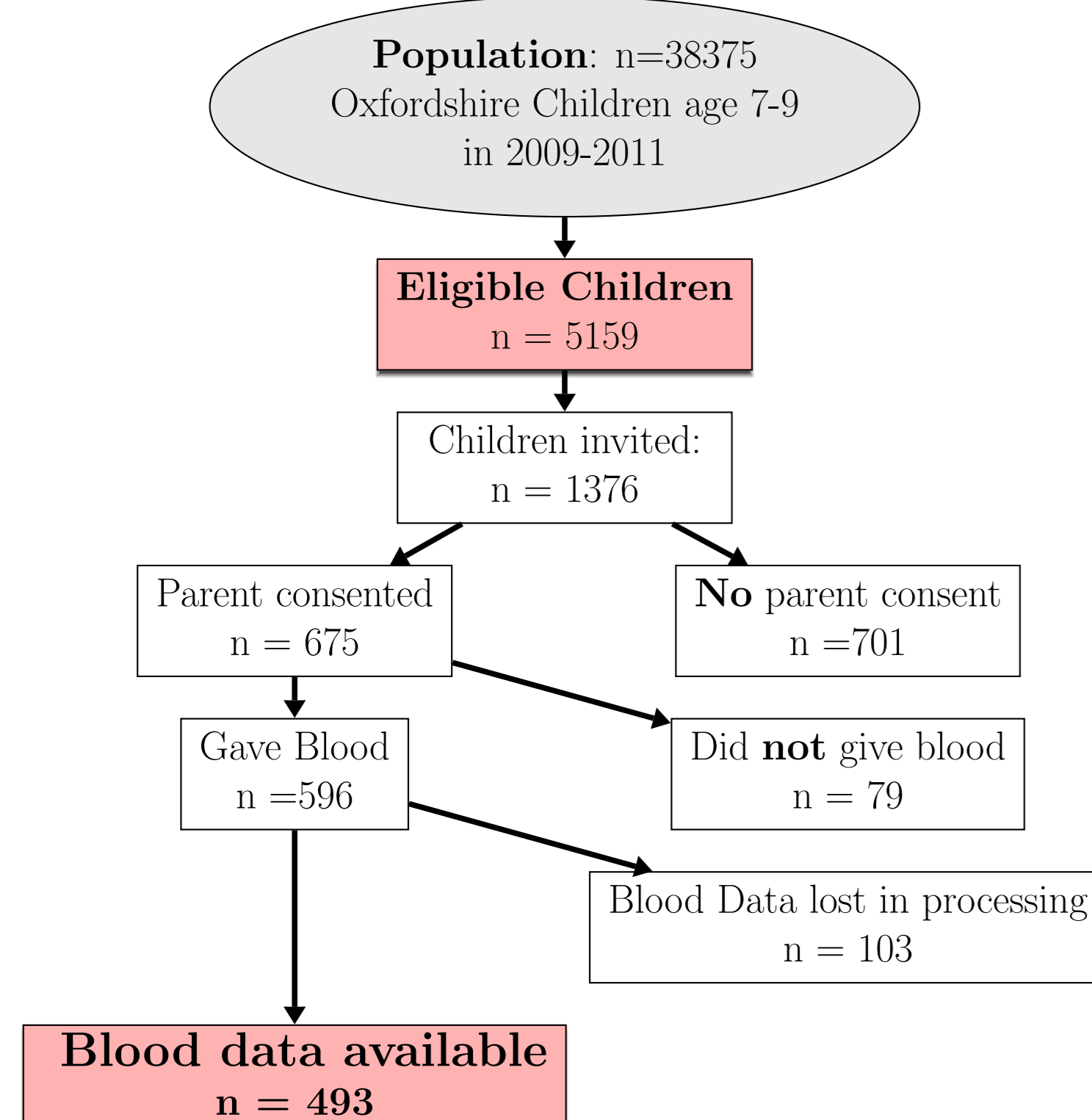
Blood was taken by way of a finger stick sample as part of screening for the DOLAB trial where children were assessed for reading and working memory using the British Ability Scales and Behaviour using the Conner's Parent Rating Scale (CPRS-L). Health was measured using an adaptation of a scale used in Stevens et al.(2003) which reports on symptoms of Constipation, Diarrhoea, Migraine, Other Headaches, and Stomachaches.

Objectives

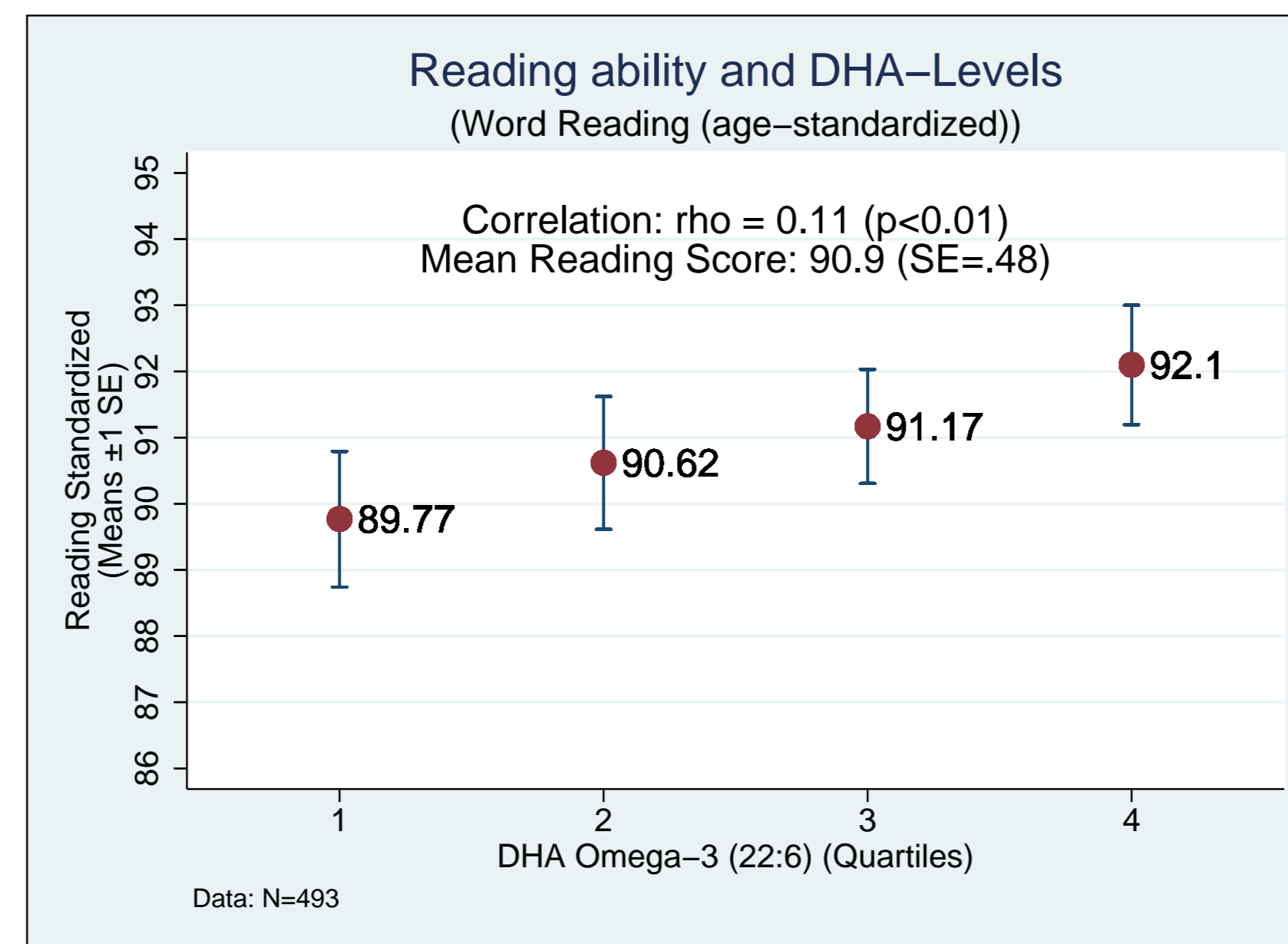
- To assess essential fatty acid concentrations in at-risk children by way of objective fingerstick tests from whole blood.
- Consider links between Omega-3s and reading, working memory, behaviour and health in this vulnerable population.

Participants

Children aged 7-9 from mainstream schools who were underperforming in literacy skills according to nationally standardised assessments of scholastic achievement at age 7 years were included. University and NHS ethics as well as parental consent and child assent was obtained.

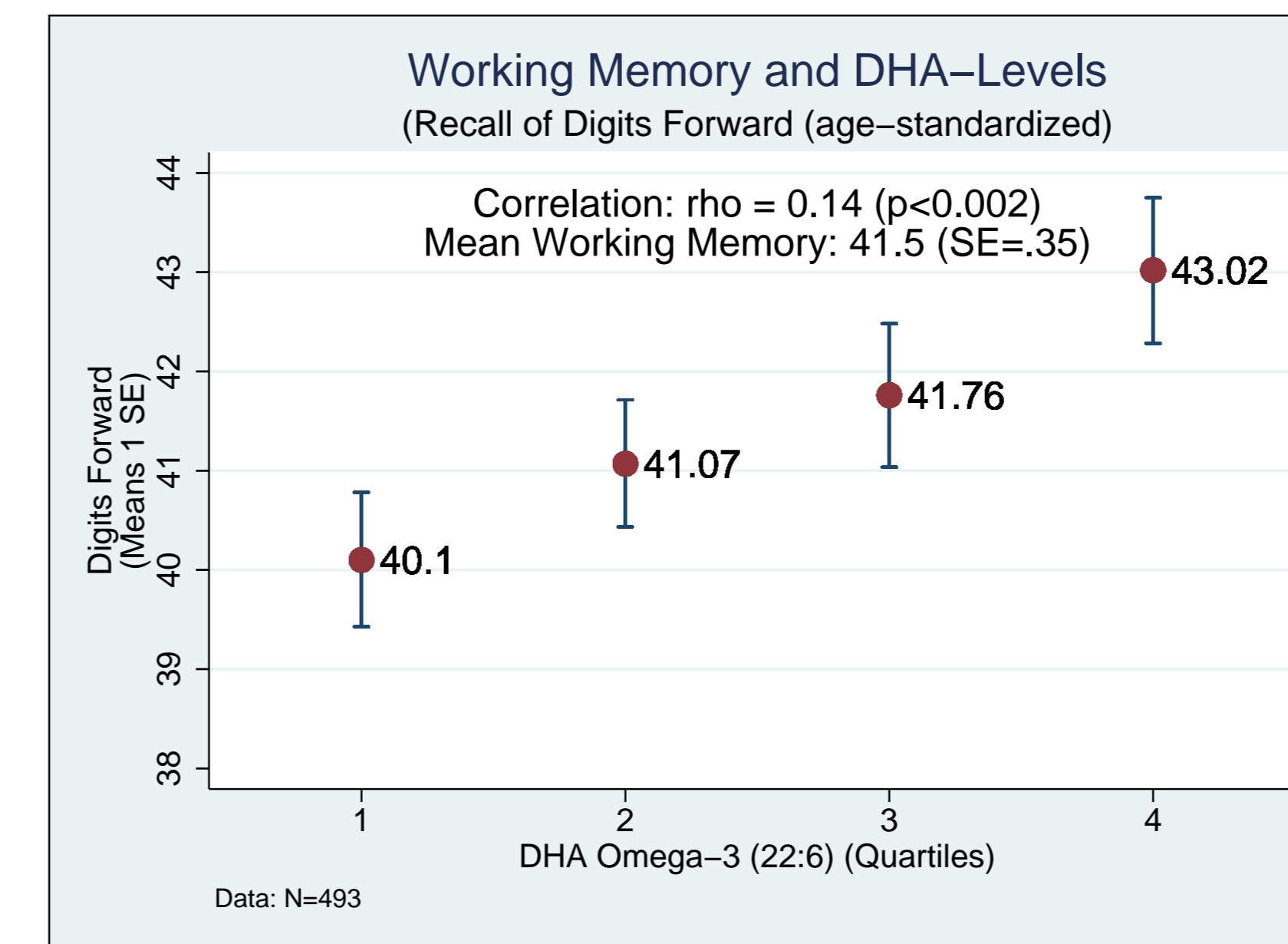


Reading and DHA Omega-3



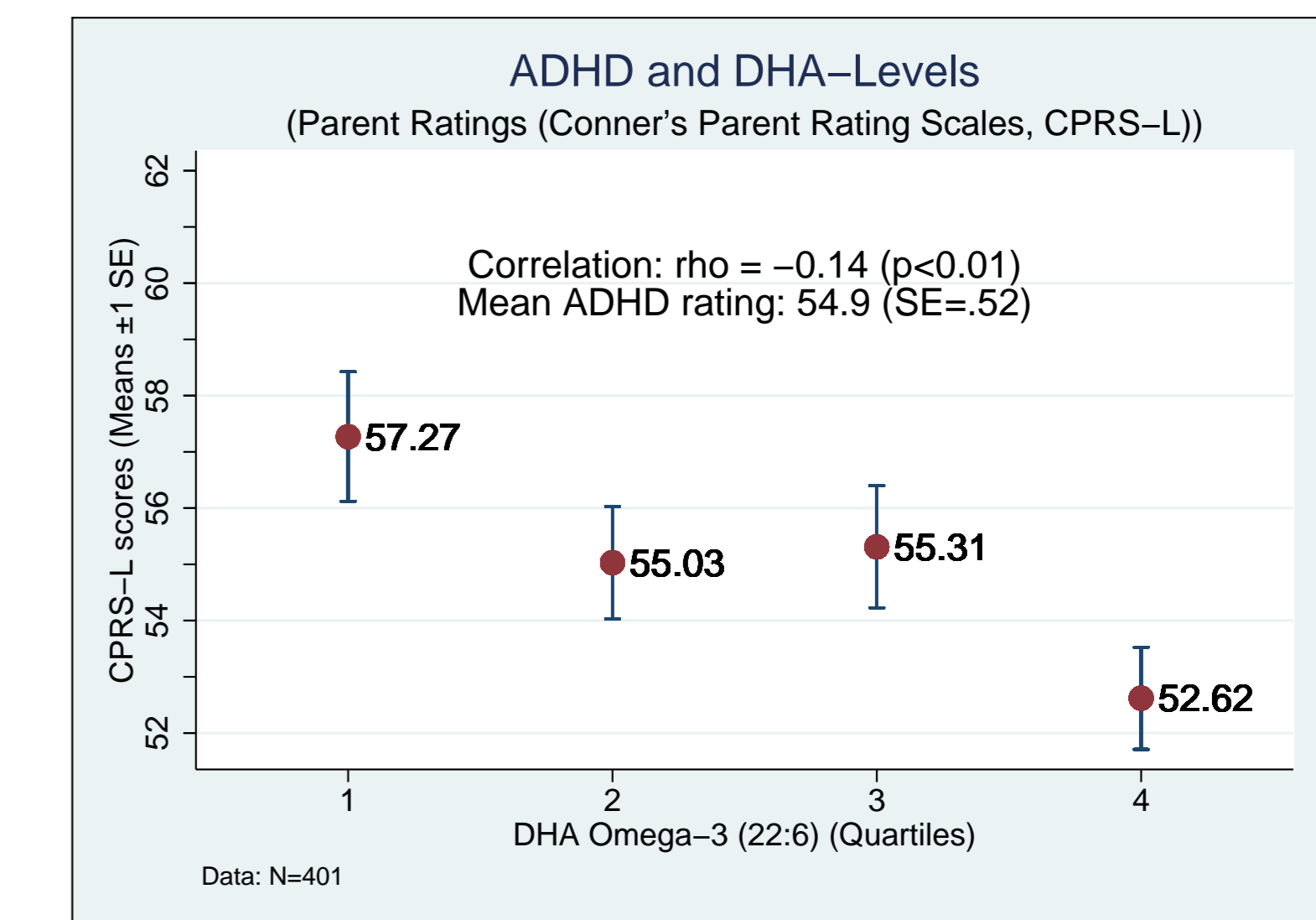
- Reading as assessed by the British Ability Scales was positively associated with Blood-DHA (Rho=0.11, p<0.01).

Working Memory and DHA Omega-3



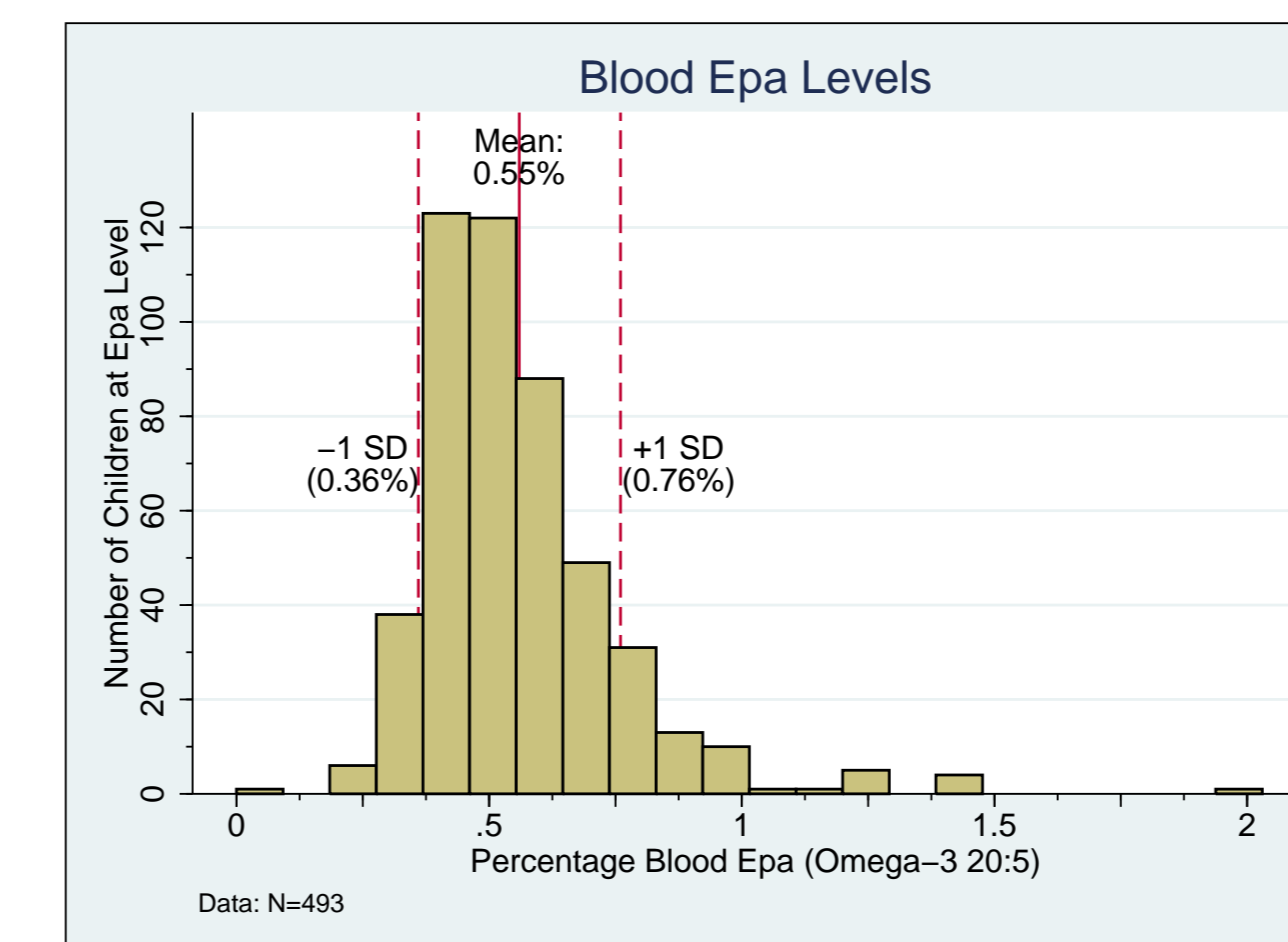
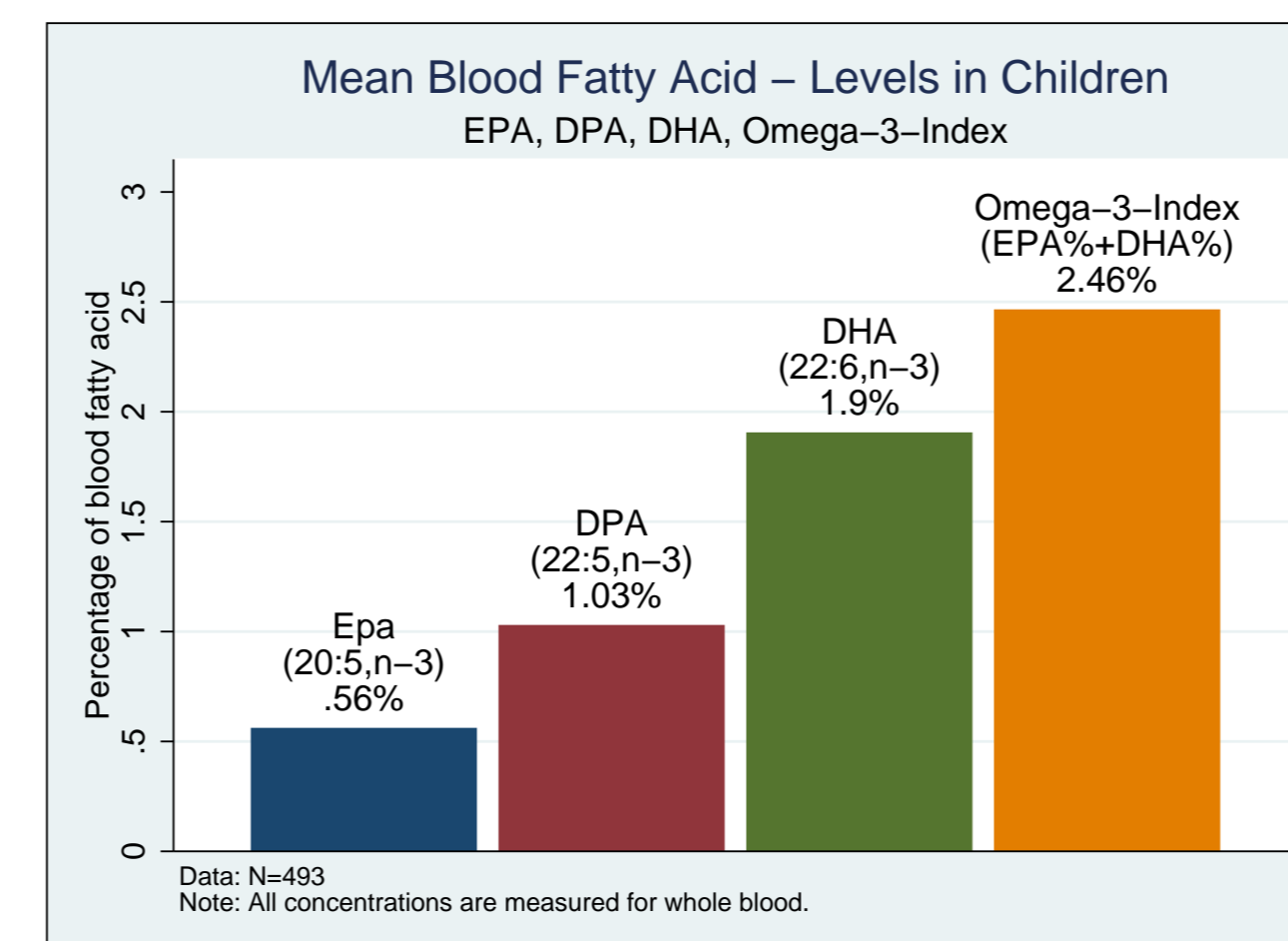
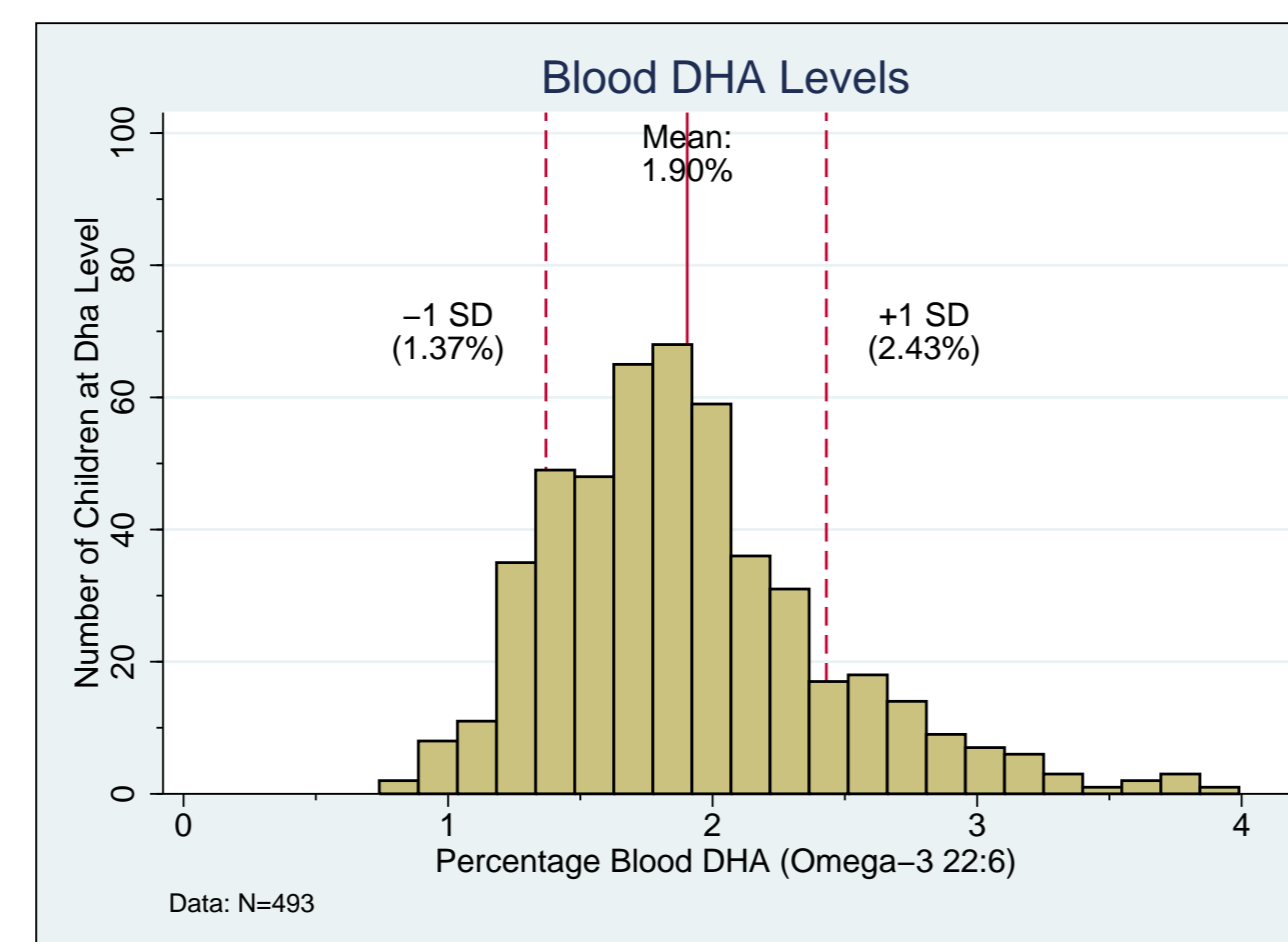
- Working memory as assessed by the Digit Forwards- Measure of the British Ability Scales was positively associated with Blood-DHA (Rho= 0.14, p<0.002).

ADHD and DHA Omega-3



- ADHD type symptoms as measured by the Global Index from the Connors Parent Rating Scale Long (CPRS-L) were negatively associated with DHA (Rho= -0.14, p<0.01).

Whole Blood Omega-3 LC-PUFA Concentrations in UK School Children



DHA Omega-3 concentrations in school children are: Mean 1.90%. These values are widely dispersed across the sample with: Sd 0.53%; Range: 0.7%–3.99%.

"Omega-3 Index"

In this population of normal UK schoolchildren, the EPA+DHA% ("Omega-3 Index") in whole blood was: 2.46% (95% Ci: 2.41%–2.52%).

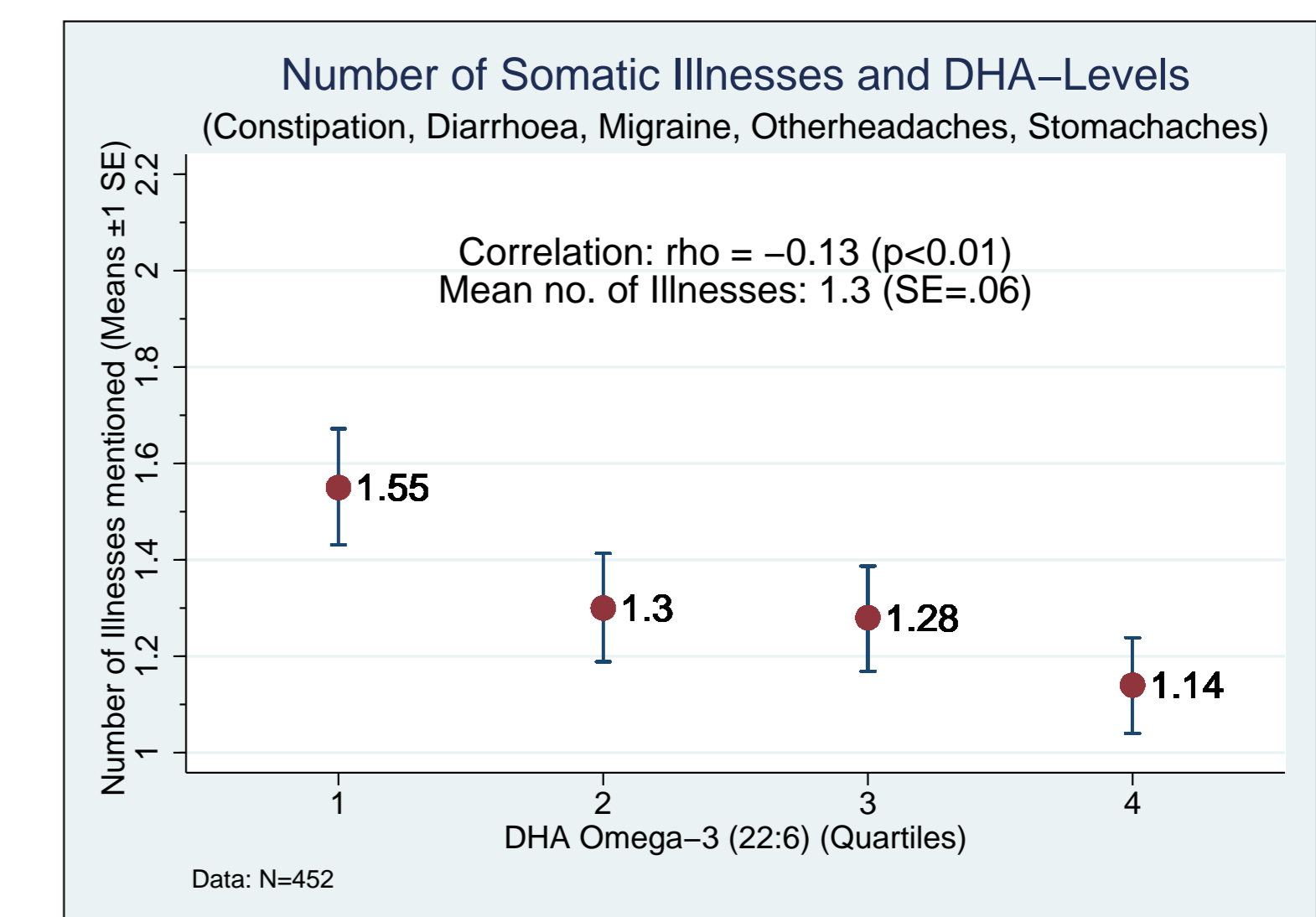
This is substantially lower than the accepted minimum level of 4% in RBC needed to maintain cardiovascular health in the general adult population. - As whole blood yields higher values than RBC these findings give cause for concern.

As shown in the flowchart blood measures were available from 493 children. Mean concentrations for key fatty acids were:

- DHA = 1.90% (95% Ci: 1.86%–1.95%)
- DPA = 1.03% (95% Ci: 1.00%–1.05%)
- EPA = 0.56% (95% Ci: 0.54%–0.58%)

EPA Omega-3 concentrations in school children are less dispersed than DHA Omega-3 concentrations: Mean: 0.56%; Sd: 0.19%; Range: 0.00%–2.05%.

Health and DHA Omega-3



- The health scale was negatively associated with Blood-DHA (Rho = -0.13, p<0.01).

Conclusions

In line with previous studies we found that lower blood-concentrations of Omega-3 LC-PUFA (particularly DHA) are associated with poorer reading and working memory performance, as well as more parent rated behaviour problems in otherwise healthy school children. Health problems were also lower in children with higher levels of DHA.

These associations require further investigation in high quality intervention studies as improving Omega-3 status may lead to benefits in child behaviour and learning in the general population.

Acknowledgements:

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