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Dietary glycaemic index and cognitive function: associations in adults aged 53y of the 1946 British birth cohort

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The brain relies on glucose for its function(1) obtained mainly from carbohydrate (CHO)-containing foods. Several, mostly single meal studies, investigated whether the rate of glucose release would affect cognitive functioning using the established CHO classification of the glycaemic index (GI), with inconsistent results(2). We studied associations between usual diet GI and cognitive function at age 53y in members of the MRC National Survey of Health and Development (1946 British birth cohort)(3). We hypothesised that consumption of a low GI diet would be associated with a better cognitive function since it is associated with a more constant postprandial blood glucose concentration(4).

Analysis included data from 939 (54·5 % female) cohort members with complete diet data (based on 5-day estimated food diaries) at age 53, cognition data at both ages 53y and 63y and potential confounders. Diet GI was calculated by assigning a glycaemic load (GL) value for each food item, then summing the GL values for the day and dividing this by the total daily CHO in grams(5). Cognitive function was assessed by a 15-item word-learning task (short term episodic memory), and a letter search test requiring mental speed, visual scanning and focused concentration(6). Multivariable linear or logistic regression models were used to examine associations between quartiles of diet GI, with the lowest GI quartile used as reference, and results of cognitive function tests presented as continuous outcome variables or in tertiles (in case of highly skewed variables) respectively. Analyses were adjusted for potential confounders as shown in the Table.

There was a significant trend for lower memory score, lower letter search number of hits, letter search speed and higher speed-accuracy trade-off (calculated as speed/accuracy) with increasing diet GI quartile. Only the associations for speed-accuracy trade-off remained significant in the fully adjusted model. Significant GI x sex interactions were found for letter search number of hits and speed-accuracy trade-off. No difference in letter search accuracy by diet GI quartile was found.

In conclusion, the study findings indicate a robust association between dietary GI and speed-accuracy trade-off. The attenuation of the association between letter search speed and cognition when adjusted for adolescent cognition and overall education strongly suggests reverse causality. These initial cross-sectional findings will be further explored in longitudinal analysis.

Table 1. Associations between diet GI quartiles and cognitive function test results at age 53 adjusting for potential confounders[1]

	1st GI quartile (low)	2nd GI quartile	3rd GI quartile	4th GI quartile (high)	*p-value for trend*
Letter search speed[2]					
	Mean difference (95 % CI)	Mean difference (95 % CI)	Mean difference (95 % CI)	Mean difference (95 % CI)	
Model 1	1 (REF)	−18·5 (−31·9, −5·1)	−21·7 (−35·0, −8·4)	−30·4 (−43·7, −17·1)	*<0·001*
Model 6	1 (REF)	−14·4 (−28·0, −0·8)	−14·1 (−28·4, 0·2)	−12·3 (−28·4, 3·8)	*0·154*
Letter search speed-accuracy trade-off[2]					
	OR (95 % CI)	OR (95 % CI)	OR (95 % CI)	OR (95 % CI)	
Model 1	1 (REF)	1·41 (1·01, 1·98)	1·89 (1·35, 2·63)	2·06 (1·48, 2·89)	*<0·001*
Model 6	1 (REF)	1·34 (0·93, 1·91)	1·68 (1·16, 2·45)	1·61 (1·06, 2·46)	*0·047*

1. Model 1: unadjusted; Model 6: adjusted for sex, cognition at age 15, educational attainment, social class, BMI, waist circumference, smoking status, physical activity, blood pressure, serum triglyceride concentration, HDL cholesterol, energy intake, intake of: % fat, % saturated fat, % alcohol, % protein, % carbohydrates, % sugars, non-starch polysaccharides and energy intake: estimated energy requirements.
2. Letter search speed was analyzed using linear regression in its continuous form. Letter search speed-accuracy trade-off was highly skewed so it was categorized in tertiles and analyzed using ordinal logistic regression.

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