Mediterranean diet adherence and cognitive function in older, UK adults

Shannon, Oliver M; Stephan, Blossom C M; Granic, Antoneta; Lentjes, Marleen; Hayat, Shabina; Mulligan, Angela; Brayne, Carol; Khaw, Kay-tee; Bundy, Rafe; Aldred, Sarah; Hornberger, Michael; Paddick, Stella-maria; Muniz-tererra, Graciela; Minihane, Anne-marie; Mathers, John C; Siervo, Mario

DOI:
10.1093/ajcn/nqz114

Supplementary Material

ONLINE SUPPORTING MATERIAL

Shannon et al. Mediterranean diet adherence and cognitive function in older, UK adults: The EPIC-Norfolk study

Contents

Supplementary Table 1: Components and scoring of the MEDAS and MEDAS Continuous Mediterranean diet adherence scales 2

Supplementary Table 2: Components and scoring of the Pyramid Mediterranean diet adherence scale 4

Supplementary Table 3: Additional participant characteristics at baseline (HC1) of the EPIC-Norfolk study according to Mediterranean diet adherence score 6

Supplementary Table 4: Mediterranean diet adherence at HC1 and the risk of poor cognitive performance at HC3 of the EPIC-Norfolk study 7

Supplementary Table 5: Mediterranean diet adherence at HC1 and risk of poor cognitive performance at HC3 in maximally adjusted models, with participants stratified by CVD risk 9

Supplementary Table 6: Mediterranean diet adherence at HC2 and cognitive function at HC3 of the EPIC-Norfolk study 10

Supplementary Table 7: Mediterranean diet adherence at HC2 and the risk of poor cognitive performance at HC3 of the EPIC-Norfolk study 11

Supplementary Table 8: Sensitivity analysis exploring the influence of each component of the MedDiet in the MEDAS and MEDAS Continuous scale at HC1 on cognitive function at HC3 of the EPIC-Norfolk study in maximally adjusted models 13

Supplementary Table 9: Sensitivity analysis exploring the influence of each component of the MedDiet in the Pyramid score at HC1 on cognitive function at HC3 of the EPIC-Norfolk study in maximally adjusted models 14

Supplementary Table 10: Sensitivity analysis excluding potential under- or over-reporters for energy intake in maximally adjusted models exploring associations between Mediterranean diet adherence at HC1 and cognitive function at HC3 of the EPIC-Norfolk study. 15

Supplementary Table 11: Interaction between Mediterranean diet adherence at HC1 and CVD risk status and risk of poor cognitive performance at HC3 in maximally adjusted models 16

Supplementary Table 12: A comparison of participant characteristics at HC3 of the EPIC-Norfolk study between individuals with complete and incomplete cognitive test data 17

Supplementary Figure 1: Participant flow chart. Participants for the current study were individuals who provided both dietary data at HC1 and cognitive function data at HC3 of the EPIC-Norfolk study. 18

Supplementary Material

Supplementary Table 1: Components and scoring of the MEDAS and MEDAS Continuous Mediterranean diet adherence scales

Food component	Contributing foods from the EPIC-Norfolk food frequency questionnaire	MEDAS[1]		MEDAS Continuous[2]	
		Servings required for 0 points	Servings required for 1 point	Servings required for 0 points	Servings required for 1 point
Olive oil[5]	Main fat used for frying? Main fat used for baking?	Non-consumption	Consumption	Non-consumption	Consumption
Olive oil[3]	Based on standardised recipe quantities for fat/olive oil associated with FFQ items AND answer to main fat question where relevant	<4 tbsp/d	≥4 tbsp/d	0 tbsp/d	≥4 tbsp/d
Vegetables[3, 7]	Vegetable soup, ketchup, pickles, carrots, spinach, broccoli/ sprint greens/ kale, sprouts, cabbage, marrow/ courgettes, cauliflower, parsnip/ turnip/ swede, leeks, onions, garlic, mushrooms, peppers, green salad/ lettuce/ cucumber/ celery, beansprouts, green beans/ broad beans/ runner beans, watercress, tomatoes, sweetcorn, beetroot, coleslaw, avocado	<2/d (and/or not including 1/d raw or salad)	≥2/d (including ≥1/d raw or salad)	0/d	≥2/d (including ≥1/d raw or salad)
Fruit[3]	Apples, pears, oranges/satsumas/mandarins, grapefruits, bananas, grapes, melon, peaches/plums/apricots, strawberries/raspberries/kiwi, tinned fruit, fruit from pies/ tarts, fruit juice	<3/d	≥3/d	0/d	≥3/d
Red meat[4]	Beef, pork, lamb, beefburgers, red meat soups (e.g. oxtail), bacon, ham, corned beef, sausages, savoury pie, liver, lasagne	>1/d	<1/d	≥2/d	<1/d
Butter, margarine or cream[4]	Single cream, double cream, butter, low fat spread	>1/d	<1/d	≥2/d	<1/d
Sweetened or carbonated drinks[4]	Fizzy soft drinks, fruit squash/ cordial	>1/d	<1/d	≥2/d	<1/d
Wine[3]	Wine	<7/wk	≥7/wk	0/wk	≥7/wk
Legumes[3]	Peas, baked beans, dried lentils/ beans/ peas	<3/wk	≥3/wk	0/wk	≥3/wk
Seafood[3]	Fried fish, fish fingers/fish cakes, white fish, oily fish, shellfish, fish roe/taramasalata	<3/wk	≥3/wk	0/wk	≥3/wk
Sweets or pastries[4]	Chocolate biscuits, plain biscuits, readymade cakes, readymade buns/ pastries, readymade fruit pies, readymade sponge, milk puddings, ice cream, chocolates, chocolate bars, sweets/ toffees/ mints	>2/wk	<2/wk	≥4/wk	<2/wk
Nuts[3]	Nuts, peanut butter	<3/wk	≥3/wk	0/wk	≥3/wk
White meat[6]	Chicken and other poultry, white meat soups (e.g. chicken)	Less white meat than red meat	More white meat than red meat	Less white meat than red meat	More white meat than red meat
Sofrito[3]	Lasagne	<2/wk	≥2/wk	0/wk	≥2/wk

[1]Scoring for the MEDAS scale was calculated according to the methods detailed by Martínez-González et al. (2012). A score of 1 point was awarded if participants achieved a dietary target. Otherwise, participants were awarded 0 points. [2]Scoring for the MEDAS Continuous scale used the same dietary components as the standard MEDAS scale. However, rather than awarding points on a binary basis, points were awarded continuously based on linear equation principles ($y = ax+b$, where y is the number of points scored between 0 and 1, a is the slope and b is the intercept). [3]A high intake of olive oil, vegetables, fruit, wine, legumes, seafood, nuts, and sofrito was recommended. For

the MEDAS Continuous scale, points were allocated between 0 for no consumption and 1 for meeting the recommended intake. [3]A low intake of red meat, butter, margarine or cream, sweetened or carbonated drinks, and sweets or pastries was recommended. For the MEDAS Continuous scale, points were allocated continuously between 0 points for double the recommended intake and 1 point for below the recommended intake. [5]For olive oil (item 1), individuals who reported consumption received a score of 1 point, whilst non-consumers received 0 points. [6]For white meat, participants were awarded a point if the total amount of white meat consumed exceeded red meat consumption. [7]A maximum score of 0.5 points was awarded for participants who did not also consume 1 serving per day of raw vegetables or salad as part of the MEDAS Continuous scale. Conversely, 0 points were awarded for participants who did not consume 1 serving per day of raw vegetables or salad as part of the MEDAS scale, irrespective of their total vegetable intake.

Supplementary Material

Supplementary Table 2: Components and scoring of the Pyramid Mediterranean diet adherence scale

Food component	Contributing foods from the EPIC-Norfolk food frequency questionnaire	Recommended intake	Servings required for 0 points	Servings required for 1 point
Vegetables[1]	Vegetable soup, ketchup, pickles, carrots, spinach, broccoli/ sprint greens/ kale, sprouts, cabbage, marrow/ courgettes, cauliflower, parsnip/ turnip/ swede, leeks, onions, garlic, mushrooms, peppers, green salad/ lettuce/ cucumber/ celery, watercress, tomatoes, sweetcorn, beetroot, coleslaw, avocado	≥6/d	0/d	≥6/d
Legumes[1]	Peas, green beans/ broad beans/ runner beans, beansprouts, baked beans, dried lentils/ beans/ peas, tofu	≥2/wk	0/wk	≥2/wk
Fruits[2]	Apples, pears, oranges/satsumas/mandarins, grapefruits, bananas, grapes, melon, peaches/plums/apricots, strawberries/raspberries/kiwi, tinned fruit, dried fruit	3-6/d	0/d	3-6/d
Nuts[2]	Nuts, peanut butter	1-2/d	0/d	1-2/d
Cereals[2]	White bread and bread rolls, brown bread and bread rolls, wholemeal bread and bread rolls, crackers, crispbread, porridge/ readybrek, breakfast cereals, white rice, brown rice, white pasta, wholemeal pasta, lasagne/ moussaka, pizza	3-6/d	0/d	3-6/d
Dairy[2]	Single or sour cream, double or clotted cream, low fat yoghurt/fromage frais, full fat yogurt or Greek yoghurt, dairy desserts, cheese, cottage cheese, milk	2/d	0/d	1.5-2.5/d
Fish[1]	Fried fish, fish fingers/fish cakes, white fish, oily fish, shellfish, fish roe/taramasalata	≥2/wk	0/wk	≥2/wk
Red meat[3]	Beef, pork, lamb, beefburgers, red meat soups (e.g. oxtail)	<2/wk	≥4/wk	<2/wk
Processed meat[3]	Bacon, ham, corned beef, sausages, savoury pie, liver	≤1/wk	≥2/wk	≤1/wk
White meat[2]	Chicken and other poultry, white meat soups (e.g. chicken)	2/wk	0/wk	1.5-2.5/wk
Egg[2]	Eggs, quiche	2-4/wk	0/wk	2-4/wk
Potato[3]	Boiled/mashed/instant/jacket potatoes, chips, roast potatoes, potato salad	≤3/wk	≥6/wk	≤3/wk
Sweets[3]	Chocolate biscuits, plain biscuits, cakes, buns/ pastries, fruit pies, sponge, milk puddings, ice cream, chocolates, chocolate bars, sweets/ toffees/ mints, sugar, jam, low calorie/ diet fizzy soft drinks, fizzy soft drinks, fruit squash/ cordial	≤2/wk	≥4/wk	≤2/wk
Alcohol[4]	Wine, beer/lager/cider, port/sherry/vermouth/liqueurs, spirits	2/d for men 1/d for women	Men = ≥4/d Women = ≥2/d	Men = 1.5-2.5/d Women = 0.5-1.5/d
Olive oil[5]	Principal fat used for cooking	Principal source of dietary lipids	Non-consumption	Consumption

Scoring for the Pyramid scale was calculated according to the methods of Tong et al. (2016). [1]A high intake of vegetables, legumes, and fish was recommended. Points were allocated continuously between 0 for no consumption and 1 for meeting the recommended intake. [2]A Moderate intake of fruits, nuts, cereals, dairy, white meat, and eggs was recommended. Points were allocated continuously between 0 for no consumption and 1 for achieving an intake within the recommended level. Overconsumption, defined as consuming an amount double the mid-point of the recommended intake, was penalised and received a maximum of 0.5 points, with points allocated proportionally between

the recommended level and the penalty point. [3]A low intake of red meat, processed meat, potato, and sweets was recommended. Points were allocated continuously between 0 points for double the recommended intake and 1 point for below the recommended intake. [4]Sex-specific recommendations were provided for alcohol consumption. Consumption within the recommended intake received 1 point, whilst overconsumption received 0 points, and non-consumption received a score of 0.5 points. Points were allocated proportionally between 0.5 points and 1 point for intake between non-consumption and the recommended level for alcohol intake. [5]For olive oil, individuals who reported consumption received a score of 1 point, whilst non-consumers received 0 points.

Supplementary Material

Supplementary Table 3: Additional participant characteristics at baseline (HC1) of the EPIC-Norfolk study according to Mediterranean diet adherence score

Characteristic	Mediterranean diet score												
	Overall	MEDAS[1]				MEDAS Continuous				Pyramid			
		Low = 0 - 2 n=2400	Medium = 3 - 4 n=4198	High = 5 - 10 n=1411	*P*	Low = 1.31 - 4.97 n=2670	Medium = 4.98 - 6.04 n=2670	High = 6.05 - 10.87 n=2669	*P*	Low = 3.47 - 7.53 n=2687	Medium = 7.54 - 8.66 n=2673	High = 8.67-12.93 n=2649	*P*
Waist circumference, cm (n=7999)	85.7 (77.0, 94.7)	87.8 (78.0, 96.0)	85.6 (76.7, 94.8)	82.4 (75.0, 92.0)	**<0.001**	87.5 (78.0, 95.5)	86.0 (77.0, 95.3)	83.6 (75.3, 93.0)	**<0.001**	88.0 (78.2, 96.3)	85.6 (77.0, 94.8)	83.0 (75.0, 92.8)	**<0.001**
Marital status, % married (n=7974)	85	88	86	82	**<0.001**	86	86	85	0.606	88	86	83	**<0.001**
Occupational status, % currently employed (n=7983)	63	64	63	64	0.376	61	63	65	**0.010**	65	62	63	**0.026**
Medication use													
Anti-hypertensive, %	12	11	12	13	0.565	12	11	12	0.370	12	12	11	0.734
Lipid-lowering, %	1	1	1	2	**0.008**	1	1	2	**0.002**	1	1	1	0.103
Steroids, %	2	3	2	2	0.358	2	2	2	0.622	2	2	2	0.692
Diabetes, %	1	1	1	1	0.497	1	1	1	0.407	1	1	1	0.718
Self-reported medical condition													
Diabetes, % (n=8008)	1	1	1	1	0.826	1	1	1	0.368	1	1	1	0.220
MI, % (n=8009)	2	1	1	2	0.171	2	1	2	**0.046**	2	1	2	0.768
Migraine, % (n=7927)	13	13	13	14	0.505	13	14	13	0.847	13	13	14	0.300
Stroke, % (n=8011)	1	1	1	1	0.222	1	1	1	0.568	1	0	1	0.166
Arrhythmia, % (n=8012)	5	4	5	6	0.197	4	4	6	**0.003**	4	5	5	**0.005**
Depression, % (n=8004)	15	14	15	15	0.542	14	14	15	0.768	14	15	15	0.453
Other psychiatric illness, % (n=8010)	3	3	3	3	0.478	2	3	3	0.108	3	3	3	0.877

Participant characteristics were compared between low, medium and high Mediterranean diet adherence groups for each score using the Kruskal-Wallis test for ordered and non-normally distributed continuous variables and the chi squared test for nominal variables. Data are presented as median (IQR) for non-normally distributed continuous data and % for nominal/ categorical data. Where measurements were not obtained in the full set of 8009 participants, the exact number of participants for the variable is stated in brackets under the variable name. [1]For the MEDAS score, it was not possible to divide participants into approximately equal sized groups, given a large number of participants achieved the same score. Therefore, participants were split into three groups where all individuals with the same score were categorised together.

Supplementary Table 4: Mediterranean diet adherence at HC1 and the risk of poor cognitive performance at HC3 of the EPIC-Norfolk study

Outcome	Cognitive domain	Model	Comparison	MEDAS OR (95% CI)	*P*	MEDAS Continuous OR (95% CI)	*P*	Pyramid OR (95% CI)	*P*
SF-EMSE	Global cognition	1	M vs. L	0.936 (0.866, 1.011)	0.393	0.879 (0.811, 0.954)	0.116	0.848 (0.781, 0.921)	0.044
			H vs. L	0.800 (0.718, 0.890)	**0.038**	0.731 (0.671, 0.797)	**<0.001**	0.694 (0.653, 0.736)	**<0.001**
		2	M vs. L	0.932 (0.800, 1.086)	0.366	0.884 (0.752, 1.038)	0.132	0.857 (0.729, 1.008)	0.062
			H vs. L	0.790 (0.638, 0.976)	**0.029**	0.726 (0613, 0.861)	**<0.001**	0.698 (0.589, 0.828)	**<0.001**
		3	M vs. L	0.982 (0.842, 1.146)	0.820	0.941 (0.800, 1.108)	0.466	0.946 (0.803, 1.115)	0.510
			H vs. L	0.910 (0.734, 1.129)	0.392	0.829 (0.697, 0.986)	**0.034**	0.841 (0.706, 1.002)	0.053
		4	M vs. L	0.982 (0.841, 1.146)	0.817	0.940 (0.799, 1.107)	0.458	0.946 (0.803, 1.115)	0.510
			H vs. L	0.908 (0.732, 1.128)	0.384	0.828 (0.696, 0.985)	**0.033**	0.841 (0.706, 1.002)	0.053
HVLT	Retrospective memory (verbal episodic memory)	1	M vs. L	0.909 (0.832, 0.993)	0.278	0.904 (0.823, 0.992)	0.279	0.789 (0.719, 0.867)	0.011
			H vs. L	0.718 (0.704, 0.732)	**0.009**	0.724 (0.656, 0.799)	**0.001**	0.668 (0.553, 0.806)	**<0.001**
		2	M vs. L	0.903 (0.751, 1.085)	0.247	0.902 (0.750, 1.083)	0.269	0.793 (0.659, 0.953)	0.014
			H vs. L	0.707 (0.551, 0.908)	**0.007**	0.715 (0.587, 0.870)	**0.001**	0.668 (0.548, 0.812)	**<0.001**
		3	M vs. L	0.941 (0.795, 1.113)	0.496	0.949 (0.788, 1.143)	0.583	0.868 (0.720, 1.046)	0.138
			H vs. L	0.800 (0.621, 1.030)	0.084	0.800 (0.655, 0.976)	**0.028**	0.786 (0.643, 0.961)	**0.019**
		4	M vs. L	0.941 (0.790, 1.121)	0.497	0.948 (0.787, 1.142)	0.577	0.866 (0.719, 1.044)	0.132
			H vs. L	0.796 (0.618, 1.026)	0.078	0.797 (0.653, 0.973)	**0.026**	0.784 (0.641, 0.959)	**0.018**
CANTAB-PAL	Retrospective memory (non-verbal episodic memory)	1	M vs. L	1.018 (0.929, 1.115)	0.845	0.918 (0.834, 1.010)	0.371	0.865 (0.786, 0.952)	0.131
			H vs. L	1.081 (0.859, 1.360)	0.514	0.936 (0.850, 1.031)	0.494	0.846 (0.768, 0.933)	0.086
		2	M vs. L	1.014 (0.848, 1.213)	0.880	0.926 (0.766, 1.118)	0.422	0.874 (0.723, 1.057)	0.165
			H vs. L	1.088 (0.860, 1.377)	0.481	0.942 (0.773, 1.142)	0.543	0.861 (0.710, 1.044)	0.127
		3	M vs. L	1.054 (0.880, 1.262)	0.566	0.975 (0.806, 1.180)	0.796	0.940 (0.777, 1.138)	0.528
			H vs. L	1.207 (0.951, 1.532)	0.121	1.036 (0.852, 1.259)	0.722	0.983 (0.807, 1.196)	0.862
		4	M vs. L	1.054 (0.880, 1.263)	0.567	0.975 (0.806, 1.180)	0.796	0.940 (0.776, 1.138)	0.526
			H vs. L	1.207 (0.951, 1.532)	0.122	1.036 (0.852, 1.259)	0.725	0.983 (0.807, 1.196)	0.861
Letter Cancellation	Attention	1	M vs. L	1.022 (0.942, 1.109)	0.789	0.908 (0.833, 0.990)	0.265	0.909 (0.834, 0.991)	0.270
			H vs. L	0.912 (0.815, 1.020)	0.411	0.831 (0.760, 909)	**0.038**	0.832 (0.695, 0.995)	**0.041**
		2	M vs. L	1.020 (0.878, 1.185)	0.812	0.910 (0.768, 1.079)	0.277	0.991 (0.771, 1.075)	0.283
			H vs. L	0.898 (0.720, 1.121)	0.344	0.824 (0.691, 0.984)	**0.033**	0.834 (0.698, 0.995)	**0.045**
		3	M vs. L	1.050 (0.894, 1.233)	0.555	0.943 (0.795, 1.118)	0.499	0.961 (0.809, 1.141)	0.648
			H vs. L	0.972 (0.777, 1.216)	0.803	0.887 (0.741, 1.061)	0.189	0.924 (0.771, 1.107)	0.392
		4	M vs. L	1.050 (0.894, 1.233)	0.556	0.943 (0.795, 1.118)	0.500	0.961 (0.809, 1.141)	0.650
			H vs. L	0.972 (0.777, 1.217)	0.805	0.887 (0.742, 1.061)	0.190	0.924 (0.771, 1.108)	0.393

Supplementary Material

VST-Simple	Simple processing speed	1	M vs. L	0.942 (0.857, 1.036)	0.531	0.960 (0.869, 1.061)	0.685	0.836 (0.756, 0.923)	0.072
			H vs. L	0.960 (0.752, 1.224)	0.742	0.863 (0.779, 0.956)	0.151	0.756 (0.682, 0.839)	**0.007**
		2	M vs. L	0.934 (0.769, 1.135)	0.476	0.958 (0.787, 1.166)	0.667	0.836 (0.687, 1.017)	0.074
			H vs. L	0.950 (0.743, 1.215)	0.682	0.851 (0.695, 1.042)	0.120	0.753 (0.614, 0.923)	**0.006**
		3	M vs. L	0.970 (0.807, 1.165)	0.750	0.999 (0.819, 1.217)	0.989	0.893 (0.732, 1.088)	0.260
			H vs. L	1.042 (0.814, 1.333)	0.748	0.926 (0.755, 1.135)	0.461	0.845 (0.687, 1.040)	0.113
		4	M vs. L	0.970 (0.808, 1.165)	0.750	0.998 (0.820, 1.217)	0.988	0.892 (0.732, 1.087)	0.259
			H vs. L	1.041 (0.814, 1.332)	0.751	0.925 (0.754, 1.136)	0.458	0.845 (0.687, 1.040)	0.112
VST-Complex	Complex processing speed	1	M vs. L	0.927 (0.844, 1.019)	0.423	0.789 (0.714, 0.872)	**0.017**	0.789 (0.723, 0.880)	**0.021**
			H vs. L	1.046 (0.926, 1.182)	0.711	0.821 (0.743, 0.907)	**0.048**	0.706 (0.637, 0.782)	**0.001**
		2	M vs. L	0.920 (0.767, 1.104)	0.380	0.786 (0.646, 0.955)	**0.016**	0.792 (0.654, 0.961)	**0.018**
			H vs. L	1.033 (0.812, 1.314)	0.793	0.814 (0.668, 0.992)	**0.041**	0.696 (0.569, 0.852)	**<0.001**
		3	M vs. L	0.939 (0.784, 1.125)	0.505	0.803 (0.660, 0.978)	**0.029**	0.821 (0.677, 0.996)	**0.047**
			H vs. L	1.090 (0.855, 1.389)	0.488	0.853 (0.699, 1.041)	0.117	0.741 (0.603, 0.910)	**0.004**
		4	M vs. L	0.939 (0.782, 1.128)	0.506	0.803 (0.660, 0.977)	**0.029**	0.820 (0.675, 0.995)	**0.045**
			H vs. L	1.087 (0.853, 1.386)	0.501	0.850 (0.697, 1.038)	0.111	0.739 (0.601, 0.907)	**0.004**
Prospective memory task	Prospective memory	1	M vs. L	0.901 (0.842, 0.964)	0.121	0.963 (0.896, 1.036)	0.606	0.919 (0.855, 0.987)	0.235
			H vs. L	0.898 (0.820, 0.984)	0.238	0.933 (0.867, 1.004)	0.344	0.773 (0.717, 0.833)	**0.001**
		2	M vs. L	0.896 (0.786, 1.022)	0.106	0.962 (0.835, 1.109)	0.595	0.923 (0.802, 1.062)	0.265
			H vs. L	0.888 (0.742, 1.061)	0.193	0.928 (0.802, 1.073)	0.315	0.773 (0.668, 0.894)	**0.001**
		3	M vs. L	0.920 (0.805, 1.051)	0.220	0.993 (0.861, 1.145)	0.924	0.966 (0.839, 1.113)	0.633
			H vs. L	0.953 (0.796, 1.141)	0.602	0.993 (0.875, 1.151)	0.927	0.842 (0.726, 0.977)	**0.025**
		4	M vs. L	0.920 (0.805, 1.051)	0.220	0.993 (0.861, 1.145)	0.920	0.965 (0.837, 1.112)	0.619
			H vs. L	0.951 (0.793, 1.140)	0.586	0.992 (0.856, 1.149)	0.912	0.841 (0.724, 0.977)	**0.023**

SF-EMSE, Short Form Extended Mini Mental State Exam (n = 7917); HVLT, Hopkins Verbal Learning Test (n = 7589);, CANTAB-PAL, Paired Associates Learning Test from the Cambridge Automated Neuropsychological Test Battery (n = 6970); Letter cancellation (n = 7847); VST-Simple, Visual Sensitivity Test, simple version (n = 6685); VST-Complex, Visual Sensitivity Test, complex version (n = 6685); Prospective memory task (n = 7841). Associations were explored via logistic regression. Model 1 was adjusted for age, sex, BMI, waist circumference, marital status, and employment status. Model 2 was additionally adjusted for self-reported medical conditions (heart attack, stroke, arrhythmia, diabetes, depression, and other psychological illness), self-reported medication (BP lowering, lipid lowering, steroids, diabetes medication), HDL and LDL cholesterol, total triglycerides, smoking status, physical activity status, systolic BP and diastolic BP. Model 3 was additionally adjusted for education. Model 4 was additionally adjusted for *APOE E4* genotype. Contrasts are medium versus low adherence (M vs. L) and high versus low adherence (H vs. L).

Supplementary Table 5: Mediterranean diet adherence at HC1 and risk of poor cognitive performance at HC3 in maximally adjusted models, with participants stratified by CVD risk

Outcome	Cognitive domain	CVD risk profile	Comparison	MEDAS		MEDAS Continuous		Pyramid	
				OR (95% CI)	*P*	OR (95% CI)	*P*	OR (95% CI)	*P*
SF-EMSE	Global cognition	Low	M vs. L	1.070 (0.812, 1.408)	0.631	0.941 (0.710, 1.248)	0.675	0.957 (0.718, 1.275)	0.764
			H vs. L	0.997 (0.689, 1.442)	0.986	0.753 (0.557, 1.017)	0.065	0.890 (0.661, 1.198)	0.441
		High	M vs. L	0.944 (0.781, 1.142)	0.553	0.906 (0.740, 1.109)	0.340	0.952 (0.778, 1.165)	0.634
			H vs. L	0.891 (0.679, 1.168)	0.403	0.888 (0.717, 1.101)	0.279	0.806 90.647, 1.005)	0.055
HVLT	Retrospective memory (verbal episodic memory)	Low	M vs. L	1.031 (0.729, 1.458)	0.862	1.010 (0.701, 1.455)	0.958	0.779 (0.540, 1.123)	0.181
			H vs. L	0.789 (0.490, 1.300)	0.365	0.871 (0.595, 1.277)	0.480	0.721 (0.493, 1.054)	0.091
		High	M vs. L	0.910 (0.741, 1.118)	0.370	0.896 (0.720, 1.115)	0.324	0.898 (0.721, 1.119)	0.339
			H vs. L	0.779 (0.567, 1.055)	0.106	0.756 (0.596, 0.958)	**0.021**	0.793 (0.624, 1.009)	0.059
CANTAB-PAL	Retrospective memory (non-verbal episodic memory)	Low	M vs. L	1.080 (0.776, 2.502)	0.650	1.038 (0.741, 1.454)	0.828	0.822 (0.579, 1.168)	0.275
			H vs. L	0.965 (0.622, 1.497)	0.874	0.816 (0.569, 1.170)	0.269	0.869 (0.613, 1.232)	0.430
		High	M vs. L	1.031 (0.830, 1.281)	0.781	0.913 (0.724, 1.152)	0.443	0.971 (0.771, 1.222)	0.801
			H vs. L	1.332 (0.998, 1.777)	0.052	1.145 (0.906, 1.447)	0.258	1.036 (0.815, 1.318)	0.770
Letter cancellation	Attention	Low	M vs. L	1.119 (0.845, 1.481)	0.448	0.867 (0.641, 1.174)	0.357	0.977 (0.727, 1.367)	0.984
			H vs. L	0.985 (0.672, 1.443)	0.937	0.863 (0.638, 1.167)	0.341	0.989 (0.726, 1.347)	0.944
		High	M vs. L	1.027 (0.842, 1.252)	0.793	0.971 (0.787, 1.197)	0.781	0.951 (0.771, 1.173)	0.640
			H vs. L	0.979 (0.739, 1.297)	0.884	0.901 (0.720, 1.128)	0.364	0.893 (0.712, 1.120)	0.328
VST-Simple	Simple processing speed	Low	M vs. L	0.927 (0.690, 1.244)	0.613	0.912 (0.673, 1.237)	0.558	0.886 (0.654, 1.201)	0.443
			H vs. L	1.170 (0.810, 1.692)	0.403	0.820 (0.599, 1.124)	0.219	0.839 (0.612, 1.151)	0.281
		High	M vs. L	0.988 (0.770, 1.267)	0.923	1.020 (0.784, 1.327)	0.883	0.879 (0.676, 1.143)	0.336
			H vs. L	0.956 (0.677, 1.350)	0.797	1.027 (0.781, 1.352)	0.847	0.841 (0.638, 1.109)	0.223
VST-Complex	Complex processing speed	Low	M vs. L	0.888 (0.658, 1.198)	0.437	0.912 (0.664, 1.252)	0.568	1.040 (0.885, 1.223)	0.807
			H vs. L	0.962 (0.653, 1.419)	0.846	0.848 (0.614, 1.172)	0.319	0.867 (0.620, 1.213)	0.405
		High	M vs. L	0.977 (0.769, 1.242)	0.851	0.728 (0.565, 0.939)	**0.015**	0.707 (0.551, 0.908)	**0.007**
			H vs. L	1.185 (0.861, 1.629)	0.298	0.852 (0.658, 1.103)	0.225	0.667 (0.551, 0.871)	**0.003**
Prospective memory	Prospective memory	Low	M vs. L	0.882 (0.704, 1.104)	0.273	0.902 (0.706, 1.151)	0.406	0.849 (0.667, 1.081)	0.185
			H vs. L	0.975 (0.730, 1.302)	0.862	1.042 (0.820, 1.323)	0.738	0.859 (0.674, 1.095)	0.220
		High	M vs. L	0.950 (0.803, 1.123)	0.546	1.050 (0.879, 1.256)	0.589	1.039 (0.870, 1.241)	0.673
			H vs. L	0.944 (0.746, 1.194)	0.629	0.971 (0.804, 1.173)	0.760	0.826 (0.681, 1.002)	0.052

SF-EMSE, Short Form Extended Mini Mental State Exam (low risk n = 3942, high risk n = 3914); HVLT, Hopkins Verbal Learning Test (low risk n = 3847, high risk n = 3685);, CANTAB-PAL, Paired Associates Learning Test from the Cambridge Automated Neuropsychological Test Battery (low risk n = 3549, high risk n = 3366); Letter cancellation (low risk n = 3931, high risk n = 3855); VST-Simple, Visual Sensitivity Test, simple version (low risk n = 3424, high risk n = 3207); VST-Complex, Visual Sensitivity Test, complex version (low risk n = 3424, high risk n = 3207); Prospective memory task (low risk n = 3925, high risk n = 3855). Associations were explored via logistic regression. Contrasts are medium versus low adherence (M vs. L) and high versus low adherence (H vs. L). Participants are stratified in to low and high CVD risk by the QRISK2 score median.

Supplementary Table 6: Mediterranean diet adherence at HC2 and cognitive function at HC3 of the EPIC-Norfolk study

Outcome	Cognitive domain	Model	MEDAS		MEDAS Continuous		Pyramid	
			β + SE	*P*	β + SE	*P*	β + SE	*P*
SF-EMSE	Global cognition	1	-0.007 ± 0.002	**0.001**	-0.011 ± 0.002	**<0.001**	-0.018 ± 0.002	**<0.001**
		2	-0.007 ± 0.002	**0.001**	-0.011 ± 0.002	**<0.001**	-0.018 ± 0.002	**<0.001**
		3	-0.002 ± 0.002	0.273	-0.004 ± 0.003	0.056	-0.011 ± 0.002	**<0.001**
		4	-0.002 ± 0.002	0.266	-0.004 ± 0.003	0.053	-0.011 ± 0.002	**<0.001**
HVLT	Retrospective memory (verbal episodic memory)	1	-0.006 ± 0.002	**0.007**	-0.007 ± 0.002	**0.002**	-0.010 ± 0.002	**<0.001**
		2	-0.006 ± 0.002	**0.008**	-0.007 ± 0.002	**0.004**	-0.010 ± 0.002	**<0.001**
		3	-0.001 ± 0.002	0.501	0.000 ± 0.002	0.869	0.002 ± 0.002	0.309
		4	-0.002 ± 0.002	0.467	0.000 ± 0.002	0.831	0.002 ± 0.002	0.291
CANTAB-PAL	Retrospective memory (non-verbal episodic memory)	1	-0.019 ± 0.040	0.632	0.026 ± 0.043	0.553	0.115 ± 0.042	**0.007**
		2	-0.023 ± 0.040	0.562	0.019 ± 0.044	0.672	0.122 ± 0.043	**0.004**
		3	-0.075 ± 0.040	0.061	-0.059 ± 0.044	0.175	0.031 ± 0.043	0.468
		4	-0.074 ± 0.040	0.063	-0.059 ± 0.044	0.181	0.032 ± 0.043	0.463
Letter Cancellation	Attention	1	-0.066 ± 0.054	0.218	-0.055 ± 0.058	0.257	0.067 ± 0.058	0.248
		2	-0.067 ± 0.054	0.217	-0.057 ± 0.059	0.701	0.070 ± 0.058	0.227
		3	-0.113 ± 0.054	**0.037**	-0.125 ± 0.060	**0.036**	-0.006 ± 0.059	0.918
		4	-0.113 ± 0.054	**0.037**	-0.125 ± 0.060	**0.037**	-0.006 ± 0.059	0.921
VST-Simple	Simple processing speed	1	-0.002 ± 0.001	**0.005**	-0.003 ± 0.001	**0.001**	-0.004 ± 0.001	**<0.001**
		2	-0.002 ± 0.001	**0.005**	-0.003 ± 0.001	**0.001**	-0.004 ± 0.001	**<0.001**
		3	-0.002 ± 0.001	**0.037**	-0.002 + 0.001	**0.016**	-0.003 + 0.001	**0.004**
		4	-0.002 ± 0.001	**0.034**	-0.002 + 0.001	**0.015**	-0.003 + 0.001	**0.003**
VST-Complex	Complex processing speed	1	-0.001 + 0.001	0.244	-0.002 + 0.001	0.028	-0.002 + 0.001	**0.007**
		2	-0.001 + 0.001	0.272	-0.002 + 0.001	0.035	-0.002 + 0.001	**0.009**
		3	-0.001 + 0.001	0.389	-0.002 + 0.001	0.074	-0.002 + 0.001	**0.026**
		4	-0.001 + 0.001	0.377	-0.002 + 0.001	0.070	-0.002 + 0.001	**0.025**

SF-EMSE, Short Form Extended Mini Mental State Exam (n = 5851); HVLT, Hopkins Verbal Learning Test (n = 5605); CANTAB-PAL, Paired Associates Learning Test from the Cambridge Automated Neuropsychological Test Battery (n = 5120); Letter cancellation task (n = 5769); VST-Simple, Visual Sensitivity Test, simple version (n = 4887); VST-Complex, Visual Sensitivity Test, complex version (n = 4887). Associations were explored via linear regression. Model 1 was adjusted for age, sex, BMI, waist circumference, marital status, and employment status. Model 2 was additionally adjusted for self-reported medical conditions (heart attack, stroke, arrhythmia, diabetes, depression, and other psychological illness), self-reported medication (BP lowering, lipid lowering, steroids, diabetes medication), HDL and LDL cholesterol, total triglycerides, smoking status, physical activity status, systolic and diastolic BP. Model 3 was additionally adjusted for education. Model 4 was additionally adjusted for *APOE E4* genotype. Scores for the SF-EMSE and HVLT were negatively skewed, and therefore log and reverse score transformed variables were derived. Lower transformed scores on these tests reflect better cognitive performance (i.e. greater original scores). VST-Simple and VST-Complex scores were log transformed (log10), whilst untransformed variables were used for the CANTAB-PAL and Letter Cancellation Task.

Supplementary Table 7: Mediterranean diet adherence at HC2 and the risk of poor cognitive performance at HC3 of the EPIC-Norfolk study

Outcome	Cognitive domain	Model	Comparison	MEDAS		MEDAS Continuous		Pyramid	
				OR (95% CI)	*P*	OR (95% CI)	*P*	OR (95% CI)	*P*
SF-EMSE	Global cognition	1	M vs. L	0.912 (0.829, 1.003)	0.333	0.999 (0.908, 1.099)	0.990	1.002 (0.838, 1.197)	0.985
			H vs. L	0.812 (0.637, 1.034)	0.082	0.824 (0.777, 0.874)	0.054	0.752 (0.616, 0.917)	**0.005**
		2	M vs. L	0.909 (0.753, 1.097)	0.321	0.990 (0.820, 1.196)	0.919	0.998 (0.827, 1.204)	0.983
			H vs. L	0.802 (0.632, 1.016)	0.068	0.814 (0.667, 0.994)	**0.044**	0.749 (0.612, 0.916)	**0.005**
		3	M vs. L	0.965 (0.798, 1.168)	0.716	1.040 (0.860, 1.259)	0.684	1.103 (0.912, 1.335)	0.312
			H vs. L	0.914 (0.718, 1.162)	0.463	0.943 (0.770, 1.156)	0.574	0.883 (0.718, 1.085)	0.236
		4	M vs. L	0.962 (0.795, 1.164)	0.693	1.038 (0.857, 1.256)	0.704	1.105 (0.913, 1.337)	0.306
			H vs. L	0.911 (0.716, 1.159)	0.446	0.938 (0.765, 1.150)	0.541	0.882 (0.718, 1.084)	0.234
HVLT	Retrospective memory (verbal episodic memory)	1	M vs. L	0.895 (0.728, 1.100)	0.296	0.905 (0.812, 1.008)	0.353	1.011 (0.823, 1.243)	0.917
			H vs. L	0.785 (0.602, 1.024)	0.075	0.802 (0.644, 0.998)	0.050	0.820 (0.656, 1.025)	0.083
		2	M vs. L	0.891 (0.722, 1.099)	0.280	0.900 (0.727, 1.114)	0.331	1.013 (0.819, 1.253)	0.904
			H vs. L	0.797 (0.609, 1.042)	0.097	0.816 (0.653, 1.021)	0.075	0.829 (0.661, 1.039)	0.104
		3	M vs. L	0.937 (0.758, 1.158)	0.546	0.942 (0.760, 1.168)	0.587	1.115 (0.899, 1.383)	0.332
			H vs. L	0.884 (0.674, 1.160)	0.373	0.921 (0.734, 1.157)	0.481	0.961 (0.763, 1.212)	0.739
		4	M vs. L	0.929 (0.751, 1.148)	0.495	0.936 (0.755, 1.162)	0.550	1.122 (0.904, 1.392)	0.297
			H vs. L	0.869 (0.662, 1.141)	0.312	0.906 (0.721, 1.138)	0.396	0.958 (0.760, 1.209)	0.720
CANTAB-PAL	Retrospective memory (non-verbal episodic memory)	1	M vs. L	0.952 (0.852, 1.065)	0.661	1.151 (1.030, 1.287)	0.205	0.935 (0.752, 1.161)	0.543
			H vs. L	1.158 (0.961, 1.396)	0.269	1.051 (0.937, 1.178)	0.666	0.912 (0.734, 1.132)	0.416
		2	M vs. L	0.959 (0.769, 1.195)	0.707	1.153 (0.928, 1.438)	0.197	0.940 (0.755, 1.171)	0.583
			H vs. L	1.183 (0.910, 1.538)	0.210	1.076 (0.857, 1.351)	0.528	0.935 (0.747, 1.172)	0.561
		3	M vs. L	1.000 (0.801, 1.248)	1.000	1.194 (0.958, 1.488)	0.114	1.007 (0.807, 1.256)	0.951
			H vs. L	1.274 (0.977, 1.660)	0.073	1.173 (0.931, 1.477)	0.176	1.040 (0.827, 1.309)	0.735
		4	M vs. L	1.000 (0.802, 1.248)	0.999	1.194 (0.958, 1.489)	0.114	1.007 (0.807, 1.256)	0.951
			H vs. L	1.274 (0.977, 1.660)	0.073	1.173 (0.931, 1.477)	0.176	1.040 (0.827, 1.309)	0.735
Letter Cancellation	Attention	1	M vs. L	1.141 (1.027, 1.267)	0.210	1.007 (0.908, 1.116)	0.946	0.964 (0.800, 1.162)	0.718
			H vs. L	1.211 (0.951, 1.542)	0.128	1.058 (0.848, 1.321)	0.586	0.870 (0.712, 1.062)	0.184
		2	M vs. L	1.139 (0.926, 1.400)	0.218	1.004 (0.820, 1.230)	0.969	0.960 (0.786, 1.171)	0.686
			H vs. L	1.202 (0.938, 1.540)	0.145	1.054 (0.858, 1.293)	0.617	0.858 (0697, 1.057)	0.150
		3	M vs. L	1.177 (0.956, 1.448)	0.124	1.029 (0.839, 1.261)	0.786	1.008 (0.824, 1.232)	0.940
			H vs. L	1.286 (1.002, 1.651)	**0.049**	1.134 (0.921, 1.396)	0.235	0.929 (0.752, 1.147)	0.494
		4	M vs. L	1.178 (0.958, 1.450)	0.121	1.030 (0.840, 1.263)	0.777	1.007 (0.824, 1.231)	0.946
			H vs. L	1.288 (1.003, 1.654)	**0.047**	1.137 (0.923, 1.400)	0.226	0.929 (0.752, 1.148)	0.496

Supplementary Material

VST-Simple	Simple processing speed	1	M vs. L	0.913 (0.887, 0.940)	0.423	0.950 (0.849, 1.064)	0.653	0.811 (0.722, 0.910)	0.070
			H vs. L	0.635 (0.474, 0.849)	**0.002**	0.687 (0.543, 0.870)	**0.002**	0.749 (0.595, 0.943)	**0.016**
		2	M vs. L	0.913 (0.731, 1.142)	0.426	0.954 (0.763, 1.192)	0.679	0.807 (0.642, 1.014)	0.065
			H vs. L	0.634 (0.472, 0.852)	**0.002**	0.683 (0.536, 0.871)	**0.002**	0.744 (0.588, 0.942)	**0.014**
		3	M vs. L	0.946 (0.756, 1.184)	0.628	0.978 (0.782, 1.223)	0.845	0.869 (0.690, 1.095)	0.234
			H vs. L	0.685 (0.509, 0.922)	**0.013**	0.748 (0.585, 0.956)	**0.020**	0.841 (0.661, 1.069)	0.158
		4	M vs. L	0.945 (0.755, 1.182)	0.618	0.978 (0.781, 1.223)	0.843	0.870 (0.691, 1.095)	0.236
			H vs. L	0.684 (0.508, 0.920)	**0.012**	0.746 (0.583, 0.954)	**0.019**	0.840 (0.661, 1.069)	0.157
VST-Complex	Complex processing speed	1	M vs. L	0.960 (0.856, 1.077)	0.726	0.750 (0.668, 0.842)	**0.013**	0.841 (0.751, 0.942)	0.126
			H vs. L	0.957 (0.739, 1.239)	0.754	0.822 (0.732, 0.922)	0.088	0.695 (0.617, 0.784)	**0.002**
		2	M vs. L	0.970 (0.773, 1.217)	0.790	0.761 (0.605, 0.957)	**0.020**	0.844 (0.675, 1.055)	0.136
			H vs. L	0.981 (0.743, 1.296)	0.893	0.836 (0.665, 1.052)	0.126	0.701 (0.553, 0.888)	**0.003**
		3	M vs. L	0.987 (0.786, 1.240)	0.914	0.772 (0.613, 0.971)	**0.027**	0.873 (0.698, 1.094)	0.238
			H vs. L	1.023 (0.774, 1.354)	0.871	0.877 (0.695, 1.105)	0.265	0.739 (0.581, 0.940)	**0.014**
		4	M vs. L	0.986 (0.785, 1.239)	0.906	0.772 (0.613, 0.971)	**0.027**	0.874 (0.698, 1.094)	0.239
			H vs. L	1.021 (0.772, 1.351)	0.882	0.874 (0.694, 1.103)	0.257	0.739 (0.581, 0.940)	**0.014**
Prospective memory task	Prospective memory	1	M vs. L	0.973 (0.845, 1.120)	0.741	1.048 (0.966, 1.138)	0.565	0.966 (0.816, 1.145)	0.678
			H vs. L	0.817 (0.668, 0.999)	**0.049**	0.891 (0.757, 1.048)	0.173	0.870 (0.737, 1.025)	0.100
		2	M vs. L	0.966 (0.822, 1.135)	0.672	1.043 (0.887, 1.226)	0.612	0.963 (0.818, 1.133)	0.650
			H vs. L	0.815 (0.665, 0.998)	**0.048**	0.896 (0.757, 1.060)	0.201	0.870 (0.735, 1.029)	0.103
		3	M vs. L	0.994 (0.845, 1.168)	0.937	1.066 (0.906, 1.254)	0.444	1.010 (0.857, 1.190)	0.909
			H vs. L	0.865 (0.705, 1.061)	0.164	0.958 (0.807, 1.136)	0.622	0.940 (0.792, 1.115)	0.476
		4	M vs. L	0.989 (0.841, 1.164)	0.898	1.062 (0.902, 1.250)	0.469	1.010 (0.857, 1.190)	0.905
			H vs. L	0.861 (0.701, 1.056)	0.151	0.951 (0.802, 1.129)	0.568	0.937 (0.790, 1.112)	0.458

SF-EMSE, Short Form Extended Mini Mental State Exam (n = 5851); HVLT, Hopkins Verbal Learning Test (n = 5605); CANTAB-PAL, Paired Associates Learning Test from the Cambridge Automated Neuropsychological Test Battery (n = 5120); Letter cancellation task (n = 5769); VST-Simple, Visual Sensitivity Test, simple version (n = 4887); VST-Complex, Visual Sensitivity Test, complex version (n = 4887); Prospective memory task (n = 5801). Associations were explored via logistic regression. Model 1 was adjusted for age, sex, BMI, waist circumference, marital status, and employment status. Model 2 was additionally adjusted for self-reported medical conditions (heart attack, stroke, arrhythmia, diabetes, depression, and other psychological illness), self-reported medication (BP lowering, lipid lowering, steroids, diabetes medication), HDL and LDL cholesterol, total triglycerides, smoking status, physical activity status, systolic BP and diastolic BP. Model 3 was additionally adjusted for education. Model 4 was additionally adjusted for *APOE E4* genotype. Contrasts are medium versus low adherence (M vs. L) and high versus low adherence (H vs. L).

Supplementary Table 8: Sensitivity analysis exploring the influence of each component of the MedDiet in the MEDAS and MEDAS Continuous scale at HC1 on cognitive function at HC3 of the EPIC-Norfolk study in maximally adjusted models

Component	MEDAS SF-EMSE B + SE		MEDAS Continuous SF-EMSE B + SE	P
Full score	-0.004 ± 0.002	**0.018**	-0.005 ± 0.002	**0.008**
Minus olive oil	-0.004 ± 0.002	**0.040**	-0.005 ± 0.002	**0.018**
Minus vegetables	-0.005 ± 0.002	**0.015**	-0.006 ± 0.002	**0.006**
Minus fruit	-0.004 ± 0.002	0.076	-0.005 ± 0.002	**0.029**
Minus red meat	-0.004 ± 0.002	**0.032**	-0.005 ± 0.002	**0.010**
Minus high fat dairy	-0.007 ± 0.002	**0.001**	-0.008 ± 0.002	< **0.001**
Minus sugar sweetened drinks	-0.005 ± 0.002	**0.014**	-0.006 ± 0.002	**0.004**
Minus wine	-0.004 ± 0.002	0.063	-0.003 ± 0.002	0.206
Minus legumes	-0.005 ± 0.002	**0.010**	-0.006 ± 0.002	**0.002**
Minus seafood	-0.004 ± 0.002	**0.039**	-0.006 ± 0.002	**0.008**
Minus sweets	-0.005 ± 0.002	**0.008**	-0.007 ± 0.002	**0.001**
Minus nuts	-0.004 ± 0.002	**0.036**	-0.005 ± 0.002	**0.029**
Minus preferential white meat	-0.004 ± 0.002	**0.041**	-0.005 ± 0.002	**0.020**
Minus sofrito	-0.004 ± 0.002	**0.019**	-0.005 ± 0.002	**0.013**

SF-EMSE, Short Form Extended Mini Mental State Exam (n = 7917). Associations were explored via linear regression. Scores for the SF-EMSE were negatively skewed, and therefore log and reverse score transformed variables were derived. Lower transformed scores reflect better cognitive performance (i.e. greater original scores).

Supplementary Table 9: Sensitivity analysis exploring the influence of each component of the MedDiet in the Pyramid score at HC1 on cognitive function at HC3 of the EPIC-Norfolk study in maximally adjusted models

Component	SF-EMSE		HVLT		VST-Simple	
	B + SE	P	B + SE	P	B + SE	P
Full score	-0.012 ± 0.002	**<0.001**	-0.009 ± 0.002	**<0.001**	-0.002 ± 0.001	**0.013**
Minus vegetables	-0.014 ± 0.002	**<0.001**	-0.009 ± 0.002	**<0.001**	-0.002 ± 0.001	**0.016**
Minus legumes	-0.012 ± 0.002	**<0.001**	-0.009 ± 0.002	**<0.001**	-0.002 ± 0.001	**0.013**
Minus fruits	-0.013 ± 0.002	**<0.001**	-0.009 ± 0.002	**<0.001**	-0.002 ± 0.001	**0.013**
Minus nuts	-0.013 ± 0.002	**<0.001**	-0.009 ± 0.002	**<0.001**	-0.002 ± 0.001	**0.018**
Minus cereals	-0.011 ± 0.002	**<0.001**	-0.008 ± 0.002	**<0.001**	-0.002 ± 0.001	**0.027**
Minus dairy	-0.012 ± 0.002	**<0.001**	-0.009 ± 0.002	**<0.001**	-0.002 ± 0.001	**0.024**
Minus fish	-0.014 ± 0.002	**<0.001**	-0.009 ± 0.002	**<0.001**	-0.002 ± 0.001	**0.024**
Minus red meat	-0.013 ± 0.002	**<0.001**	-0.011 ± 0.002	**<0.001**	-0.002 ± 0.001	**0.005**
Minus processed meat	-0.013 ± 0.002	**<0.001**	-0.010 ± 0.002	**<0.001**	-0.002 ± 0.001	**0.007**
Minus white meat	-0.011 ± 0.002	**<0.001**	-0.008 ± 0.002	**<0.001**	-0.002 ± 0.001	**0.028**
Minus eggs	-0.012 ± 0.002	**<0.001**	-0.009 ± 0.002	**<0.001**	-0.002 ± 0.001	**0.020**
Minus potato	-0.013 ± 0.002	**<0.001**	-0.009 ± 0.002	**<0.001**	-0.002 ± 0.001	**0.012**
Minus sweets	-0.013 ± 0.002	**<0.001**	-0.009 ± 0.002	**<0.001**	-0.002 ± 0.001	**0.011**
Minus alcohol	-0.012 ± 0.002	**<0.001**	-0.009 ± 0.002	**<0.001**	-0.002 ± 0.001	**0.022**
Minus olive oil	-0.012 ± 0.002	**<0.001**	-0.009 ± 0.002	**<0.001**	-0.002 ± 0.001	**0.013**

SF-EMSE, Short Form Extended Mini Mental State Exam (n = 7917); HVLT, Hopkins Verbal Learning Test (n = 7589); VST, Visual Sensitivity Test (n = 6685). Associations were explored via linear regression. Scores for the SF-EMSE and HVLT were negatively skewed, and therefore log and reverse score transformed variables were derived. Lower transformed scores on these tests reflect better cognitive performance (i.e. greater original scores). VST-Simple scores were log transformed (log10).

Supplementary Table 10: Sensitivity analysis excluding potential under- or over-reporters for energy intake in maximally adjusted models exploring associations between Mediterranean diet adherence at HC1 and cognitive function at HC3 of the EPIC-Norfolk study.

Outcome	Cognitive domain	MEDAS		MEDAS Continuous		Pyramid	
		β + SE	*P*	β + SE	*P*	β + SE	*P*
SF-EMSE	Global cognition	-0.004 ± 0.002	0.057	-0.005 ± 0.002	0.060	-0.013 ± 0.002	**<0.001**
HVLT	Retrospective memory (verbal episodic memory)	-0.003 ± 0.002	0.139	-0.006 ± 0.002	**0.021**	-0.010 ± 0.002	**<0.001**
CANTAB-PAL	Retrospective memory (non-verbal episodic memory)	-0.006 ± 0.045	0.889	-0.014 ± 0.049	0.781	0.043 ± 0.047	0.360
Letter Cancellation	Attention	0.020 ± 0.061	0.747	0.071 ± 0.066	0.279	0.056 ± 0.063	0.376
VST-Simple	Simple processing speed	-0.002 ± 0.001	0.090	-0.002 ± 0.001	0.071	-0.003 ± 0.001	**0.005**
VST-Complex	Complex processing speed	-0.001 ± 0.001	0.112	-0.002 ± 0.001	0.062	-0.002 ± 0.001	**0.019**

SF-EMSE, Short Form Extended Mini Mental State Exam (n = 5349); HVLT, Hopkins Verbal Learning Test (n = 5131); CANTAB-PAL, Paired Associates Learning Test from the Cambridge Automated Neuropsychological Test Battery (n = 4711); VST, Visual Sensitivity Test (n = 4502). Associations were explored via linear regression. Scores for the SF-EMSE and HVLT were negatively skewed, and therefore log and reverse score transformed variables were derived. Lower transformed scores on these tests reflect better cognitive performance (i.e. greater original scores). VST-Simple and VST-Complex scores were log transformed (log10), whilst untransformed variables were used for the CANTAB-PAL and Letter Cancellation Task.

Supplementary Table 11: Interaction between Mediterranean diet adherence at HC1 and CVD risk status and risk of poor cognitive performance at HC3 in maximally adjusted models

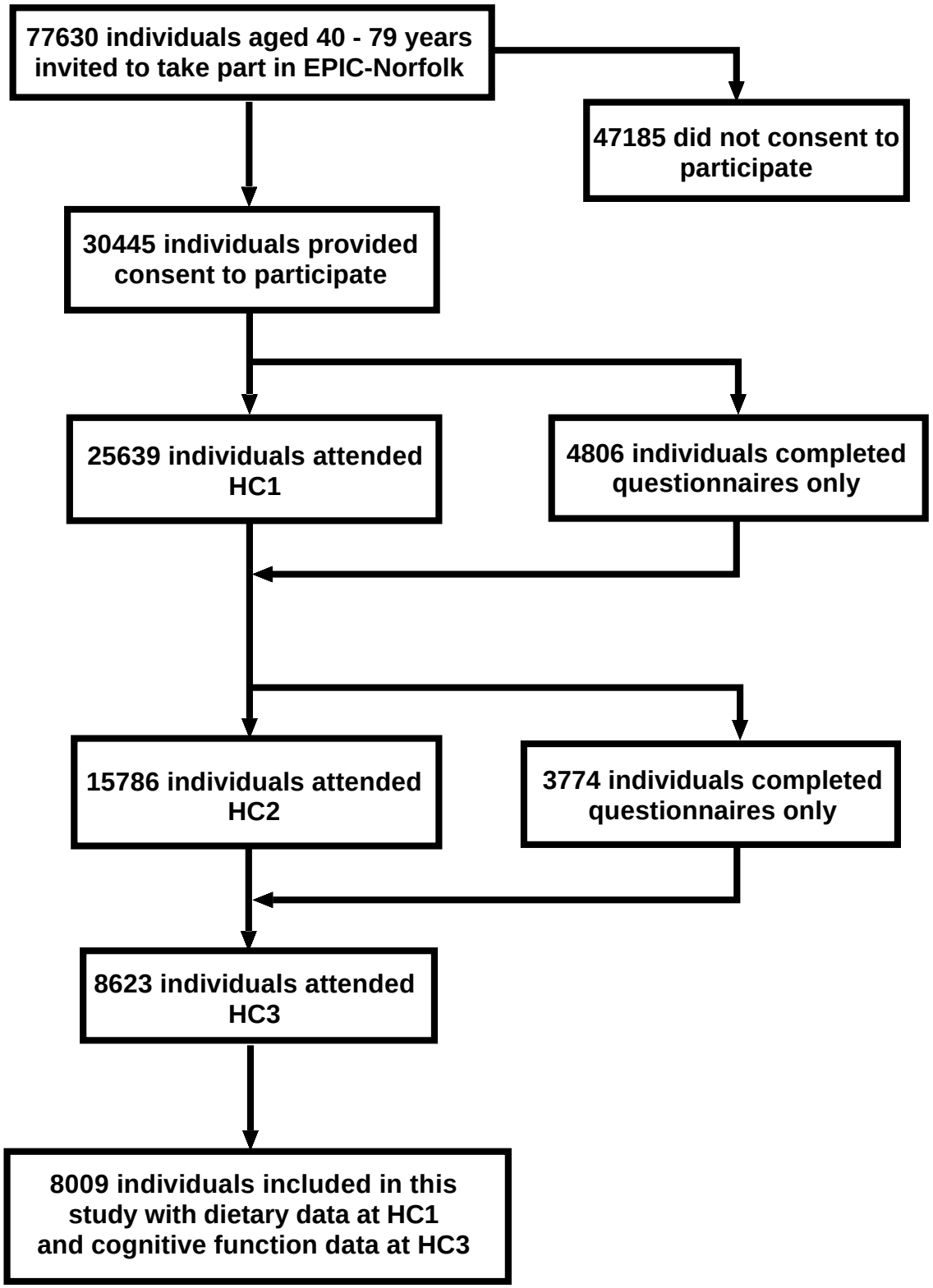
Outcome	Cognitive domain	Contrast	MEDAS OR (95% CI)	*P for interaction*	MEDAS Continuous OR (95% CI)	*P for interaction*	Pyramid OR (95% CI)	*P for interaction*
SF-EMSE	Global cognition	M vs. L * CVD risk	0.976 (0.765, 1.246)	0.847	0.994 (0.748, 1.320)	0.965	0.893 (.871, 1.189)	0.438
		H vs. L * CVD risk	0.941 (0.639, 1.385)	0.757	0.792 (0.585, 1.073)	0.132	0.963 (0.715, 1.296)	0.803
HVLT	Retrospective memory (verbal episodic memory)	M vs. L * CVD risk	1.034 (0.773, 1.384)	0.823	1.010 (0.718, 1.420)	0.956	0.889 (0.628, 1.260)	0.510
		H vs. L * CVD risk	0.944 (0.580, 1.538)	0.818	1.021 (0.710, 1.469)	0.911	0.921 (0.639, 1.327)	0.658
CANTAB-PAL	Retrospective memory (non-verbal episodic memory)	M vs. L * CVD risk	0.993 (0.747, 1.319)	0.961	1.088 (0.781, 1.515)	0.619	0.485 (0.351, 0.670)	**<0.001**
		H vs. L * CVD risk	0.648 (0.419, 1.001)	0.050	0.652 (0.462, 0.921)	**0.015**	0.516 (0.375, 0.709)	**<0.001**
Letter cancellation	Attention	M vs. L * CVD risk	0.686 (0.543, 0.867)	**0.002**	0.953 (0.704, 1.289)	0.753	1.046 (0.774, 1.413)	0.770
		H vs. L * CVD risk	0.682 (0.463, 1.006)	0.054	1.075 (0.792, 1.459)	0.643	1.129 (0.833, 1.530)	0.436
VST-Simple	Simple processing speed	M vs. L * CVD risk	0.992 (0.743, 1.324)	0.956	1.012 (0.726, 1.469)	0.946	1.047 (0.751, 1.461)	0.785
		H vs. L * CVD risk	1.262 (0.826, 1.928)	0.283	0.911 (0.648, 1.280)	0.590	0.992 (0.704, 1.398)	0.964
VST-Complex	Complex processing speed	M vs. L * CVD risk	1.003 (0.751, 1.340)	0.983	1.227 (0.873, 1.722)	0.239	1.317 (0.946, 1.833)	0.102
		H vs. L * CVD risk	0.861 (0.564, 1.314)	0.488	0.955 (0.680, 1.340)	0.789	1.105 (0.779, 1.566)	0.576
Prospective memory	Prospective memory	M vs. L * CVD risk	0.862 (0.700, 1.063)	0.165	0.793 (0.620, 1.014)	0.064	0.772 (0.605, 0.986)	**0.038**
		H vs. L * CVD risk	0.940 (0.686, 1.289)	0.701	0.974 (0.764, 1.243)	0.833	0.979 (0.764, 1.256)	0.870

SF-EMSE, Short Form Extended Mini Mental State Exam (n = 7856); HVLT, Hopkins Verbal Learning Test (n = 7532);, CANTAB-PAL, Paired Associates Learning Test from the Cambridge Automated Neuropsychological Test Battery (n = 6915); Letter cancellation (n = 7786); VST-Simple, Visual Sensitivity Test, simple version (n = 6631); VST-Complex, Visual Sensitivity Test, complex version (n = 6631); Prospective memory task (n = 7780). Analyses explored, via logistic regression, whether the associations between MedDiet adherence and risk of poor cognitive performance varied by CVD risk status (0 (low risk), 1(high risk)) by including a diet * CVD risk group interaction term in maximally adjusted models. Odds ratios indicate whether those with high CVD status compared to those with low CVD status had increased or decreased risk of poor cognitive performance if belonging to medium versus low (M vs. L) and high versus low (H vs. L) MedDiet group. Significant *P* for interactions are presented in bold.

Supplementary Table 12: A comparison of participant characteristics at HC3 of the EPIC-Norfolk study between individuals with complete and incomplete cognitive test data

Characteristic	All cognitive tests completed (n = 5861)	Partial completion of cognitive tests (n=2148)	*P*
Age, Years	67 (62, 74)	70 (64, 78)	**<0.001**
Sex, % males	44	45	0.568
BMI, kg/m^2	26 (24, 29)	26 (24, 29)	0.693
Smoking status, %			0.558
Current	4	4	
Former	46	47	
Never	50	49	
Physical activity level, %			**<0.001**
Inactive	36	41	
Moderately inactive	29	29	
Moderately active	19	16	
Active	16	15	
Education status, %			**0.001**
No education	25	30	
O-levels	13	10	
A-levels	45	43	
Degree	18	17	
Systolic BP, mmHg	136 (125, 146)	138 (127, 148)	**0.001**
Diastolic BP, mmHg	78 (72, 84)	77 (72, 84)	**0.003**
HDL cholesterol, mM	1.5 (1.2,1.8)	1.5 (1.2,1.8)	0.580
LDL cholesterol, mM	3.2 (2.5, 3.8)	3.1 (2.5, 3.9)	0.685
Total triglycerides, mM	1.5 (1.0, 2.1)	1.4 (1.0, 2.0)	0.381
QRISK2 score	17.1 (9.9, 28.2)	21.2 (12.1, 34.8)	**<0.001**

Participant characteristics were compared between individuals with complete and incomplete cognitive test data at HC3 of the EPIC-Norfolk study using the Kruskal-Wallis test or Mann Whitney U test for ordered and non-normally distributed continuous variables and the Chi squared test for nominal variables. Data are presented as median (IQR) for non-normally distributed continuous data and % for nominal/ categorical data. Results show that participants who completed all cognitive tests were typically younger, more physically active, better educated, had lower systolic BP and a lower QRISK2 score (all $P<0.05$).



Supplementary Figure 1: Participant flow chart. Participants for the current study were individuals who provided both dietary data at HC1 and cognitive function data at HC3 of the EPIC-Norfolk study.

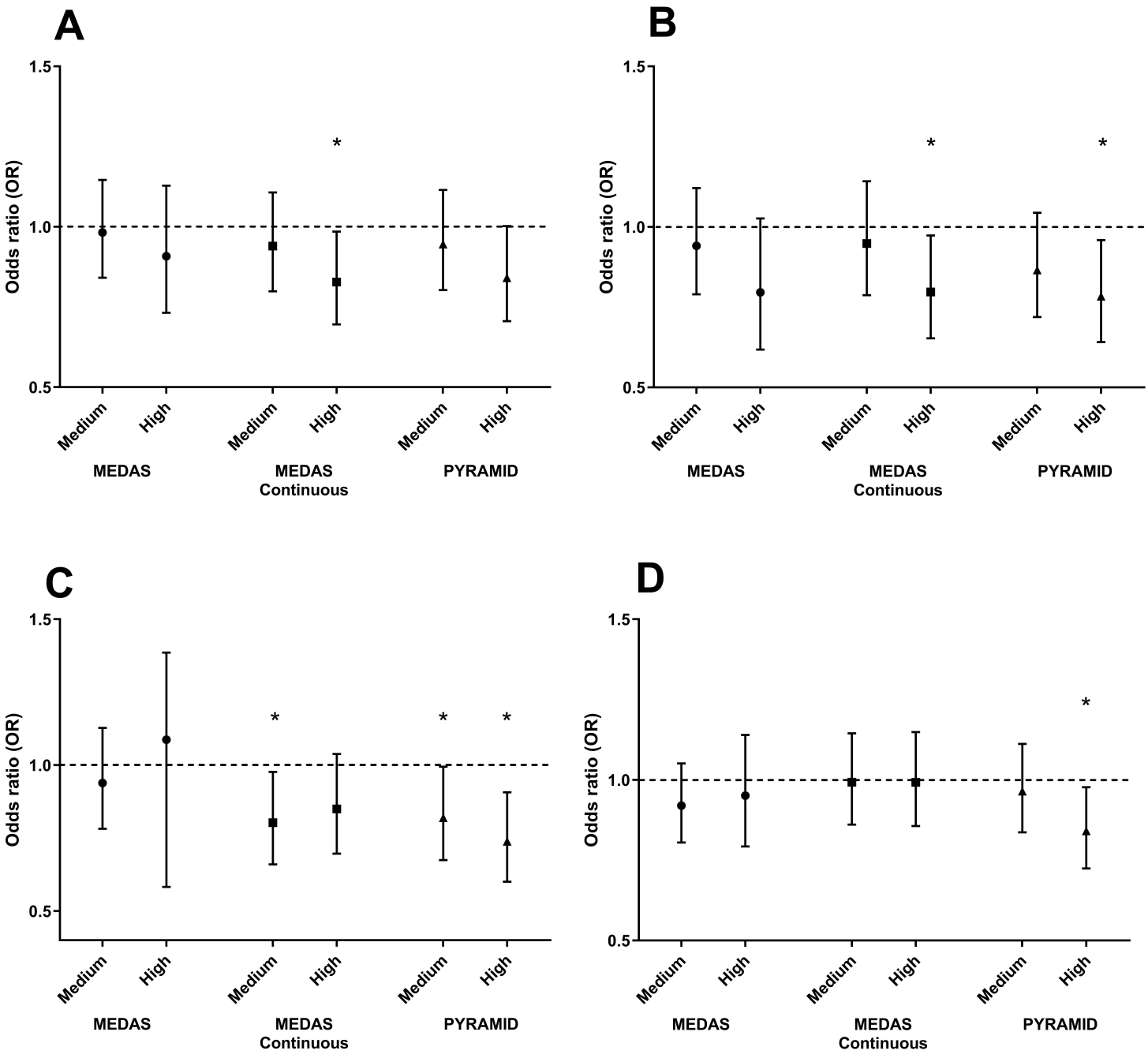

A
B
C
D
Odds ratio (OR)
1.5
1.0
0.5
*
Medium
High
MEDAS
MEDAS Continuous
PYRAMID

Figure 1

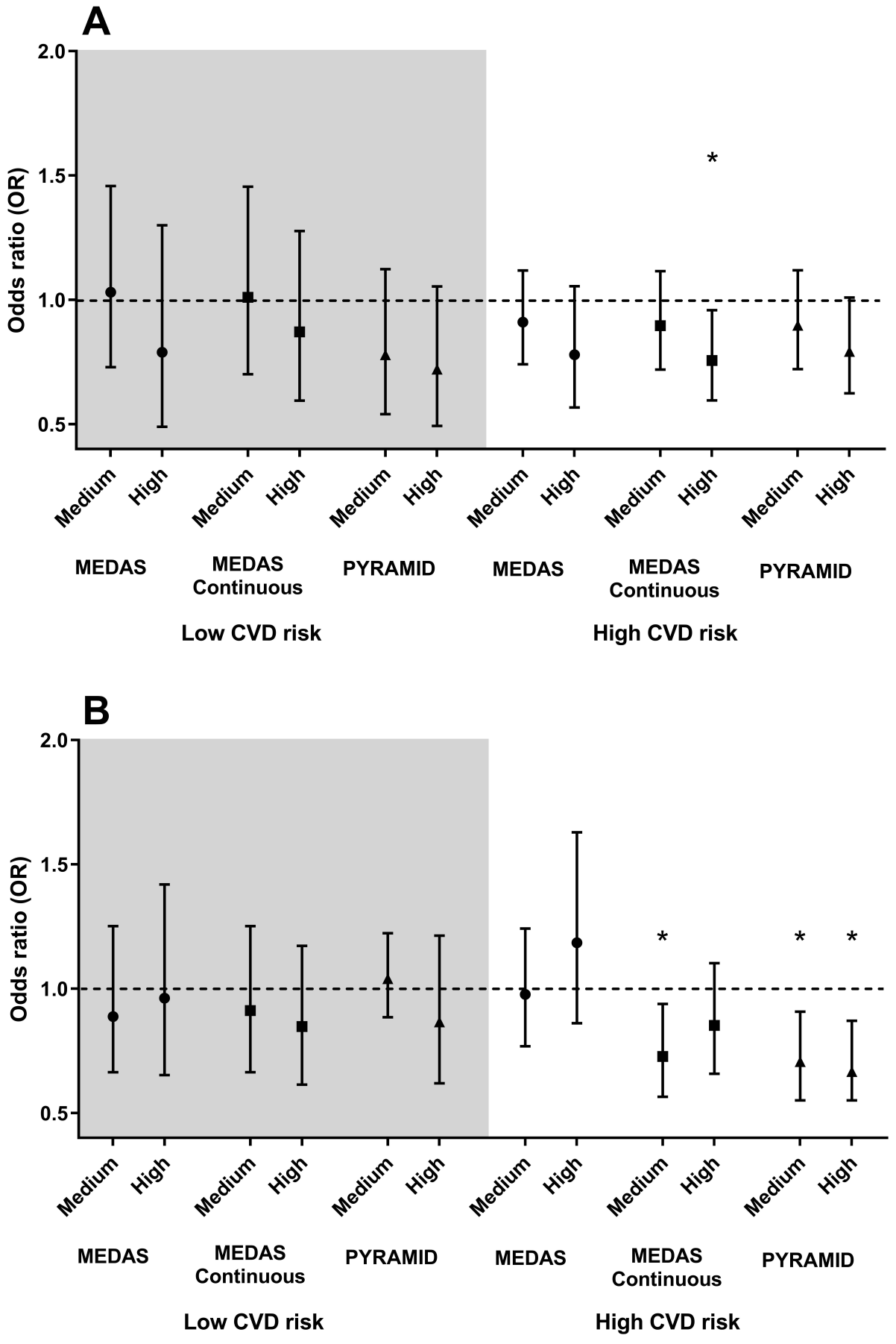

A
2.0
1.5
1.0
0.5
Odds ratio (OR)
*
Medium
High
MEDAS
MEDAS Continuous
PYRAMID
Low CVD risk
High CVD risk
B
2.0
1.5
1.0
0.5
Odds ratio (OR)
*
*
*
Medium
High
MEDAS
MEDAS Continuous
PYRAMID
Low CVD risk
High CVD risk

Figure 2