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Adherence to healthy dietary guidelines and future depressive symptoms: evidence for sex differentials in the Whitehall II study.

Tasnime N. Akbaraly, Séverine Sabia, Martin J. Shipley, David G. Batty,
Mika Kivimaki

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On-line supplemental table

Table S1: Construction of AHEI scores and hypotheses justifying the use of AHEI to assess the overall diet and depressive symptoms association.

AHEI Components		Criteria for		Possible	Hypothesis justifying the assessment of AHEI and depressive symptoms
		Min scores	Max scores	score range	
Vegetable (serving /day)		0	5	0-10	Some studies have reported an inverse association between intake of folate and other B vitamins and risk of depression (1). It has been suggested that low levels of folate might result in reduced availability of S-adenosylmethionine, a universal methyl donor, which can result in impaired formation of myelin, neurotransmitters and membrane phospholipids (2). Folate are found in large amounts in some vegetables, dried legume, fruits, nuts and soy. Some studies have shown the beneficial effects of antioxidant levels on depression (3). Antioxydants are brought in high amounts by fruits, vegetables and nuts consumption
Fruit (serving /day)		0	4	0-10	
Nuts and Soy (serving /day)		0	1	0-10	
Ratio of white to red meat		0	4	0-10	White meat included poultry or fish. high fish consumption has been related to low incidence of depression (4). Furthermore high consumption of red meat has been associated with high levels of inflammatory markers CRP (5) involved in the pathogenesis of depression (6).
**Total Fiber (% of energy)		0	24	0-10	Several studies have found an inverse association between fiber and incident CHD. We expect to see an inverse association between total fiber and depression too as CHD and depression might share common determinants. However to our knowledge, the specific fiber –depression association received little attention.
Trans Fat (% of energy)		≥4	≤0.5	0-10	Trans fatty acids have been showed to be associated with depression. The pro-inflammmatory changes and endothelial dysfunction) induced by trans fat (7) have been suggested to explain its potential harmful effect on depression reported in one study(8).
Ratio of PUFA to SFA		≤0.1	≥1	0-10	Several studies have reported an inverse association between PUFA and depression PUFA are a major component of neuron membranes and have vascular and anti-inflammatory properties. Several studies have reported an inverse association between PUFA and depression (8-10)
Duration of multivitamin Use		<5 year	≥5 year	2.5-7.5	Some studies have shown the beneficial effects of antioxidant levels on depression (3). Additionally to fruits, nuts and vegetables intake, antioxidants may be brought by use of multivitamins.
Alcohol	Men	0 or >3.5	1.5-2.5	0-10	Both heavy drinkers and abstainers have been show to develop more depressive symptoms compared to moderate alcohol consumption in numerous study (11-13)
	Women	0 or >2.5	0.5-1.5		
Total AHEI Score				2.5-87.5	

Abbreviation: AHEI, the alternative healthy eating index; PUFA, Polyunsaturated fatty acids; SAF, saturated fatty acids.

*Each AHEI component contributed from 0 to 10 points to the total AHEI score, except the multivitamin component which was dichotomous and contributing either 2.5 points (for non-use) or 7.5 points (for use) A score of 10 indicates that the recommendations were fully met, whereas a score of 0 represents the least healthy dietary behavior. Intermediate intakes were scored proportionately between 0 and 10.

**The original components of the index include cereal fiber, because cereal fiber was not available in our nutrient data set, we adapted the score by replacing it with total fiber.

† Mean score for men and women combined.

1. Tolmunen T, Hintikka J, Ruusunen A, Voutilainen S, Tanskanen A, Valkonen VP, Viinamaki H, Kaplan GA, Salonen JT. Dietary folate and the risk of depression in Finnish middle-aged men. A prospective follow-up study. *Psychother Psychosom* 2004;73:334-9.
2. Selhub J, Bagley LC, Miller J, Rosenberg IH. B vitamins, homocysteine, and neurocognitive function in the elderly. *Am J Clin Nutr* 2000;71:614S-620S.

3. Sarandol A, Sarandol E, Eker SS, Erdinc S, Vatanserver E, Kirli S. Major depressive disorder is accompanied with oxidative stress: short-term antidepressant treatment does not alter oxidative-antioxidative systems. *Hum Psychopharmacol* 2007;22:67-73.
4. Hibbeln JR. Fish consumption and major depression. *Lancet* 1998;351:1213.
5. Montonen J, Boeing H, Fritsche A, Schleicher E, Joost HG, Schulze MB, Steffen A, Pischon T. Consumption of red meat and whole-grain bread in relation to biomarkers of obesity, inflammation, glucose metabolism and oxidative stress. *Eur J Nutr* 2012.
6. Tiemeier H, Hofman A, van Tuijl HR, Kiliaan AJ, Meijer J, Breteler MM. Inflammatory proteins and depression in the elderly. *Epidemiology* 2003;14:103-7.
7. Mozaffarian D, Aro A, Willett WC. Health effects of trans-fatty acids: experimental and observational evidence. *Eur J Clin Nutr* 2009;63 Suppl 2:S5-21.
8. Sanchez-Villegas A, Verberne L, De Irala J, Ruiz-Canela M, Toledo E, Serra-Majem L, Martinez-Gonzalez MA. Dietary fat intake and the risk of depression: the SUN Project. *PLoS One* 2011;6:e16268.
9. Sanchez-Villegas A, Henriquez P, Figueiras A, Ortuno F, Lahortiga F, Martinez-Gonzalez MA. Long chain omega-3 fatty acids intake, fish consumption and mental disorders in the SUN cohort study. *Eur J Nutr* 2007;46:337-46.
10. Tiemeier H, van Tuijl HR, Hofman A, Kiliaan AJ, Breteler MM. Plasma fatty acid composition and depression are associated in the elderly: the Rotterdam Study. *Am J Clin Nutr* 2003;78:40-6.
11. Alati R, Lawlor DA, Najman JM, Williams GM, Bor W, O'Callaghan M. Is there really a 'J-shaped' curve in the association between alcohol consumption and symptoms of depression and anxiety? Findings from the Mater-University Study of Pregnancy and its outcomes. *Addiction* 2005;100:643-51.
12. Caldwell TM, Rodgers B, Jorm AF, Christensen H, Jacomb PA, Korten AE, Lynskey MT. Patterns of association between alcohol consumption and symptoms of depression and anxiety in young adults. *Addiction* 2002;97:583-94.
13. Rodgers B, Korten AE, Jorm AF, Jacomb PA, Christensen H, Henderson AS. Non-linear relationships in associations of depression and anxiety with alcohol use. *Psychol Med* 2000;30:421-32.

Table S2: Odds ratios (95% CI) for the association between 10-year change in AHEI score between phase 3 and phase 7 and the subsequent recurrent depressive symptoms (DepS) over 5 years of follow-up in men.

10-y change category in AHEI *	n	OR	95% CI	P
Model 1 (n=3029)				
Maintaining a high AHEI score (Phases 3&7 scores \geq 51.5)	982	1.10	0.74, 1.63	<i>0.64</i>
vs. low score (Phase 7 and Phase 3 scores $<$ 51.5)	1117	1	Ref	
Improving AHEI score (Phase 3 score $<$ 51.5 and Phase 7 score \geq 51.5)	510	0.82	0.50, 1.36	<i>0.45</i>
vs. maintaining low score	1117	1	ref	
Decreasing AHEI score (Phase 3 score \geq 51.5 and Phase 7 score $<$ 51.5)	420	0.84	0.49, 1.45	<i>0.53</i>
vs. maintaining high score	982	1	ref	
Model 2 (n=2861)				
Maintaining a high AHEI score (Phases 3&7 scores \geq 51.5)	931	1.38	0.91, 2.11	<i>0.13</i>
vs. low score (Phase 7 and Phase 3 scores $<$ 51.5)	1051	1	ref	
Improving AHEI score (Phase 3 score $<$ 51.5 and Phase 7 score \geq 51.5)	482	0.94	0.56, 1.58	<i>0.81</i>
vs. maintaining low score	1051	1	ref	
Decreasing AHEI score (Phase 3 score \geq 51.5 and Phase 7 score $<$ 51.5)	397	0.71	0.40, 1.27	<i>0.25</i>
vs. maintaining high score	931	1	ref	

AHEI: Alternative Healthy Eating Index; OR: odds ratio; 95% CI: Confident interval at 95 %. SD: standard deviation

Results of logistic regression estimating odds of persistent DepS according to the 10-y change in AHEI score. To analyze the 10-y change in AHEI score, scores of AHEI at phases 3 and 7 were categorized as high or low according to the median value of AHEI score at phase 3 equal to 51.5 points.

*Four categories in 10-y change of AHEI were then defined: participants who maintained a high score (Phase 3 and 7 scores \geq 51.5), those who maintained a low score over the 10-y exposure period (Phase 3 and 7 scores $<$ 51.5), participants who improved their AHEI score (Phase 3 score $<$ 51.5 and Phase 7 score \geq 51.5) and those who decreased their score (Phase 3 score \geq 51.5 points and Phase 7 score $<$ 51.5 points).

Model 1: Adjusted for age, ethnicity and total energy intake at phase 3.

Model 2: Model 1 + additionally adjusted for SES, retirement, marital status, smoking, physical activity, hypertension, HDL-cholesterol and central obesity at phase 3.

