Association of dietary overall antioxidant intake with all-cause and cause-specific mortality among adults with depression: evidence from NHANES 2005-2018

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Supplementary Table 1 Generic names of antidepressant drugs used by participants in the NHANES 2005-2018

Amitriptyline	Imipramine
Bupropion	Mirtazapine
Buspirone	Nefazodone
Citalopram	Nortriptyline
Escitalopram	Paroxetine
sertraline	Protriptyline
Fluoxetine	Venlafaxine

Supplementary Table 2 Subgroup analyses of the association of dietary antioxidant quality score (DAQs) and dietary quality index (DAI) with all-cause mortality among adults with depression in the NHANES 2005-2018

	Dietary antioxidant quality score (DAQs)			***P*-trend**	***P* interaction**
	0-2	**3-4**	**5-6**		
Age					0.811
<60	1.00	0.61(0.35-1.08)	0.69(0.39-1.22)	0.168	
≥60	1.00	0.72(0.47-1.10)	0.56(0.34-0.91)	0.020	
Gender					0.525
Male	1.00	0.66(0.41-1.05)	0.77(0.42-1.39)	0.315	
Female	1.00	0.70(0.46-1.07)	0.56(0.33-0.95)	0.027	
Body mass index					<0.001
Overweight	1.00	0.63(0.41-0.97)	0.58(0.36-0.94)	0.023	
Normal	1.00	0.89(0.49-1.64)	0.85(0.44-1.62)	0.607	
Smoking status					0.317
Never	1.00	0.58(0.35-0.97)	0.50(0.29-0.87)	0.010	
Ever or current	1.00	0.78(0.51-1.21)	0.78(0.49-1.27)	0.324	
Alcohol consumption					0.282
None-drinker	1.00	0.68(0.34-1.33)	0.56(0.31-1.01)	0.061	
Drinker	1.00	0.71(0.48-1.05)	0.66(0.41-1.08)	0.081	
NCDs					0.035
Yes	1.00	0.67(0.47-0.95)	0.71(0.46-1.01)	0.095	
No	1.00	0.77(0.33-1.79)	0.19(0.05-0.67)	0.014	
	Dietary antioxidant index (DAI)			***P*-trend**	***P* interaction**
	Tertile1	**Tertile2**	**Tertile3**		
Age					0.851
<60	1.00	0.77(0.45-1.32)	0.63(0.36-1.08)	0.097	
≥60	1.00	0.85(0.58-1.27)	0.78(0.49-1.26)	0.304	
Gender					0.762
Male	1.00	0.78(0.46-1.33)	0.65(0.38-1.11)	0.113	
Female	1.00	0.86(0.59-1.24)	0.75(0.45-1.25)	0.245	
Body mass index					<0.001
Overweight	1.00	0.85(0.57-1.26)	0.62(0.39-0.99)	0.055	
Normal	1.00	0.87(0.43-1.75)	1.01(0.59-1.71)	0.963	
Smoking status					0.359
Never	1.00	0.78(0.48-1.27)	0.52(0.31-0.85)	0.017	
Ever or current	1.00	0.86(0.54-1.35)	0.89(0.54-1.46)	0.655	
Alcohol consumption					0.707
None-drinker	1.00	1.44(0.74-2.80)	0.76(0.32-1.78)	0.754	
Drinker	1.00	0.68(0.45-1.01)	0.67(0.45-0.98)	0.041	
NCDs					0.261
Yes	1.00	0.81(0.59-1.12)	0.77(0.54-1.09)	0.127	
No	1.00	0.92(0.31-2.69)	0.37(0.11-1.26)	0.103	

The model was adjusted for age, sex and race/ethnicity, body mass index, smoking status, alcohol consumption, education level, annual household income, physical activity, fatty acid ratio,

cholesterol intake, dietary supplements use, self-reported chronic non-communicable diseases (NCDs) including diabetes, hypertension, dyslipidemia, heart disease and cancer, family history of heart diseases and antidepressants use, with exception of stratifying factors.

Supplementary Table 3 Association of dietary antioxidant quality score (DAQs) and dietary antioxidant index (DAI) with all-cause and cause-specific mortality among depressed adults after excluding participants who died within 2 years (n = 2,740)

	Dietary antioxidant quality score (DAQs)			***P*-trend**
	0-2	**3-4**	**5-6**	
All-cause mortality				
Case/n	110/909	111/1126	66/705	
Model 1 [a]	1.00	0.60(0.42-0.87)	0.59(0.38-0.94)	0.022
Model 2 [b]	1.00	0.63(0.43-0.94)	0.65(0.41-1.02)	0.054
Model 3 [c]	1.00	0.64(0.43-0.95)	0.65(0.41-1.03)	0.056
CVD mortality				
Case/n	26/909	35/1126	21/705	
Model 1 [a]	1.00	1.38(0.73-2.62)	1.05(0.46-2.39)	0.889
Model 2 [b]	1.00	1.44(0.74-2.78)	1.20(0.53-2.67)	0.649
Model 3 [c]	1.00	1.51(0.78-2.92)	1.17(0.51-2.65)	0.701
Cancer mortality				
Case/n	27/909	22/1126	10/705	
Model 1 [a]	1.00	0.31(0.15-0.66)	0.31(0.12-0.80)	0.013
Model 2 [b]	1.00	0.33(0.16-0.67)	0.35(0.14-0.84)	0.013
Model 3 [c]	1.00	0.33(0.16-0.68)	0.36(0.15-0.85)	0.015
	Dietary antioxidant index (DAI)			***P*-trend**
	Tertile 1	**Tertile 2**	**Tertile 3**	
All-cause mortality				
Case/n	103/914	100/913	84/913	
Model 1 [a]	1.00	0.73(0.51-1.04)	0.67(0.47-0.97)	0.034
Model 2 [b]	1.00	0.76(0.53-1.08)	0.73(0.50-1.08)	0.105
Model 3 [c]	1.00	0.76(0.53-1.09)	0.74(0.50-1.08)	0.113
CVD mortality				
Case/n	24/914	29/913	29/913	
Model 1 [a]	1.00	1.37(0.76-2.48)	1.49(0.76-2.94)	0.246
Model 2 [b]	1.00	1.48(0.78-2.80)	1.71(0.81-3.60)	0.156
Model 3 [c]	1.00	1.50(0.79-2.84)	1.72(0.80-3.71)	0.167
Cancer mortality				
Case/n	26/914	18/913	15/913	
Model 1 [a]	1.00	0.64(0.28-1.48)	0.34(0.15-0.79)	0.012
Model 2 [b]	1.00	0.74(0.32-1.76)	0.39(0.20-0.78)	0.012
Model 3 [c]	1.00	0.74(0.31-1.74)	0.39(0.19-0.79)	0.014

[a] Model 1 was adjusted for age, sex and race/ethnicity.

[b] Model 2 was additionally adjusted for body mass index, smoking status, alcohol consumption, education level, annual household income, physical activity, fatty acid ratio, cholesterol intake and dietary supplements use.

[c] Model 3 was additionally adjusted for self-reported chronic non-communicable diseases (NCDs) including diabetes, hypertension, dyslipidemia, heart disease and cancer, family history of heart diseases and antidepressants use.

Supplementary Table 4 Association of dietary antioxidant quality score (DAQs) and dietary antioxidant index (DAI) with all-cause and cause-specific mortality among depressed adults after excluding participants with a history of cancer (n = 2,720)

	Dietary antioxidant quality score (DAQs)			***P*-trend**
	0-2	**3-4**	**5-6**	
All-cause mortality				
Case/n	113/911	124/1110	65/699	
Model 1 [a]	1.00	0.70(0.49-1.00)	0.52(0.33-0.81)	0.004
Model 2 [b]	1.00	0.75(0.51-1.08)	0.60(0.38-0.95)	0.026
Model 3 [c]	1.00	0.75(0.51-1.09)	0.61(0.38-0.97)	0.031
CVD mortality				
Case/n	28/911	49/1110	24/699	
Model 1 [a]	1.00	1.35(0.69-2.66)	1.09(0.48-2.46)	0.820
Model 2 [b]	1.00	1.39(0.67-2.88)	1.20(0.53-2.73)	0.647
Model 3 [c]	1.00	1.42(0.68-2.95)	1.19(0.51-2.77)	0.669
Cancer mortality				
Case/n	22/911	18/1110	6/699	
Model 1 [a]	1.00	0.36(0.16-0.80)	0.26(0.09-0.77)	0.010
Model 2 [b]	1.00	0.46(0.19-1.08)	0.37(0.14-1.02)	0.041
Model 3 [c]	1.00	0.46(0.19-1.11)	0.36(0.13-0.96)	0.031
	Dietary antioxidant index (DAI)			***P*-trend**
	Tertile 1	**Tertile 2**	**Tertile 3**	
All-cause mortality				
Case/n	103/907	120/907	79/906	
Model 1 [a]	1.00	0.84(0.59-1.21)	0.62(0.42-0.91)	0.016
Model 2 [b]	1.00	0.91(0.63-1.30)	0.70(0.46-1.05)	0.094
Model 3 [c]	1.00	0.91(0.63-1.30)	0.70(0.46-1.05)	0.099
CVD mortality				
Case/n	26/907	35/907	31/906	
Model 1 [a]	1.00	1.32(0.70-2.50)	1.44(0.73-2.88)	0.287
Model 2 [b]	1.00	1.49(0.77-2.88)	1.63(0.81-3.24)	0.156
Model 3 [c]	1.00	1.45(0.75-2.82)	1.62(0.79-3.32)	0.176
Cancer mortality				
Case/n	20/907	17/907	9/906	
Model 1 [a]	1.00	0.95(0.40-2.26)	0.27(0.10-0.69)	0.007
Model 2 [b]	1.00	1.34(0.57-3.14)	0.40(0.18-0.89)	0.108
Model 3 [c]	1.00	1.26(0.57-2.81)	0.39(0.18-0.87)	0.080

[a] Model 1 was adjusted for age, sex and race/ethnicity.

[b] Model 2 was additionally adjusted for body mass index, smoking status, alcohol consumption, education level, annual household income, physical activity, fatty acid ratio, cholesterol intake and dietary supplements use.

[c] Model 3 was additionally adjusted for self-reported chronic non-communicable diseases (NCDs) including diabetes, hypertension, dyslipidemia, heart disease and cancer, family history of heart diseases and antidepressants use.

Supplementary Table 5 Association of dietary antioxidant quality score (DAQs) and dietary antioxidant index (DAI) with all-cause and cause-specific mortality among depressed adults after excluding participants with a history of CVD (n = 2,597)

	Dietary antioxidant quality score (DAQs)			***P*-trend**
	0-2	**3-4**	**5-6**	
All-cause mortality				
Case/n	86/844	91/1062	62/691	
Model 1 [a]	1.00	0.60(0.39-0.91)	0.56(0.35-0.90)	0.017
Model 2 [b]	1.00	0.61(0.36-0.94)	0.58(0.36-0.94)	0.028
Model 3 [c]	1.00	0.60(0.39-0.93)	0.59(0.37-0.96)	0.033
CVD mortality				
Case/n	19/844	24/1062	17/691	
Model 1 [a]	1.00	1.05(0.46-2.40)	1.05(0.40-2.74)	0.928
Model 2 [b]	1.00	1.09(0.46-2.58)	1.14(0.43-3.03)	0.795
Model 3 [c]	1.00	1.11(0.47-2.62)	1.11(0.41-3.00)	0.839
Cancer mortality				
Case/n	20/844	17/1062	10/691	
Model 1 [a]	1.00	0.31(0.15-0.66)	0.31(0.12-0.80)	0.025
Model 2 [b]	1.00	0.30(0.13-0.68)	0.30(0.12-0.74)	0.010
Model 3 [c]	1.00	0.29(0.12-0.70)	0.31(0.12-0.76)	0.012
	Dietary antioxidant index (DAI)			***P*-trend**
	Tertile 1	**Tertile 2**	**Tertile 3**	
All-cause mortality				
Case/n	76/866	89/866	74/865	
Model 1 [a]	1.00	0.85(0.56-1.29)	0.78(0.51-1.20)	0.092
Model 2 [b]	1.00	0.76(0.53-1.08)	0.73(0.50-1.08)	0.105
Model 3 [c]	1.00	0.86(0.56-1.30)	0.78(0.51-1.02)	0.054
CVD mortality				
Case/n	17/866	22/866	21/866	
Model 1 [a]	1.00	1.22(0.54-2.72)	1.55(0.65-3.73)	0.324
Model 2 [b]	1.00	1.43(0.61-3.32)	1.81(0.72-4.54)	0.198
Model 3 [c]	1.00	1.43(0.60-3.38)	1.80(0.70-4.63)	0.216
Cancer mortality				
Case/n	18/866	14/866	15/865	
Model 1 [a]	1.00	0.64(0.25-1.68)	0.41(0.16-1.03)	0.057
Model 2 [b]	1.00	0.77(0.28-2.08)	0.42(0.20-0.92)	0.038
Model 3 [c]	1.00	0.76(0.28-2.06)	0.43(0.19-0.96)	0.047

[a] Model 1 was adjusted for age, sex and race/ethnicity.

[b] Model 2 was additionally adjusted for body mass index, smoking status, alcohol consumption, education level, annual household income, physical activity, fatty acid ratio, cholesterol intake and dietary supplements use.

[c] Model 3 was additionally adjusted for self-reported chronic non-communicable diseases (NCDs) including diabetes, hypertension, dyslipidemia, heart disease and cancer, family history of heart diseases and antidepressants use.

Supplementary Table 6 Association between depression and all-cause and cause-specific mortality in the NHANES 2005-2018 (n = 36,308)

	Non-depression	Depression	*P*-value
All-cause mortality			
Model 1	1.00	2.20(1.92-2.53)	<0.001
Model 2	1.00	1.52(1.30-1.78)	<0.001
Model 3	1.00	1.47(1.26-1.72)	<0.001
CVD mortality			
Model 1	1.00	2.27(1.84-2.81)	<0.001
Model 2	1.00	1.54(1.16-2.04)	0.003
Model 3	1.00	1.48(1.11-1.96)	0.008
Cancer mortality			
Model 1	1.00	1.50(1.09-2.08)	0.014
Model 2	1.00	1.08(0.73-1.59)	0.691
Model 3	1.00	1.04(0.71-1.52)	0.824

[a] Model 1 was adjusted for age, sex, and race/ethnicity.

[b] Model 2 was additionally adjusted for body mass index, smoking status, alcohol consumption, education level, annual household income, physical activity, fatty acid ratio, cholesterol intake, and dietary supplements use.

[c] Model 3 was additionally adjusted for self-reported chronic non-communicable diseases (NCDs) including diabetes, hypertension, dyslipidemia, heart disease and cancer, family history of heart diseases and antidepressants use.

Supplementary Table 7 Differences in food intake among adults with and without depression in the NHANES 2005-2018 [a]

Characteristics [b]	**Non-depression (n=3051)**	**Depression (n=3051)**	***P*-value**
Total Fruits (cup eq./day)	1.09(0.02)	0.79(0.02)	<0.001
Total Vegetables (cup eq./day)	1.53(0.02)	1.24(0.02)	<0.001
Total grains (oz. eq./day)	6.28(0.06)	6.04(0.07)	0.007
Total dairy (cup eq./day)	1.46(0.02)	1.42(0.02)	0.228
Meats (oz. eq./day)			
Processed meat	0.93(0.02)	0.91(0.02)	0.393
Red meat	1.51(0.04)	1.62(0.04)	0.047
Organ meat	0.03(0.01)	0.03(0.01)	0.789
Poultry	1.50(0.03)	1.40(0.04)	0.052
Seafood	0.63(0.03)	0.50(0.03)	0.001
Others			
Legumes (oz. eq./day)	0.47(0.02)	0.48(0.02)	0.593
Nuts (oz. eq./day)	1.26(0.02)	1.17(0.02)	<0.001
Solid fats (grams/day)	36.99(0.42)	34.55(0.42)	<0.001
Added sugar (tsp. eq./day)	17.26(0.25)	19.18(0.30)	<0.001

[a] PHQ-9 scores ≥10 were considered to indicate individuals with depression. The control and depression groups were matched by sex and age (± 2 years), and the number of control and depression groups was 1:1.

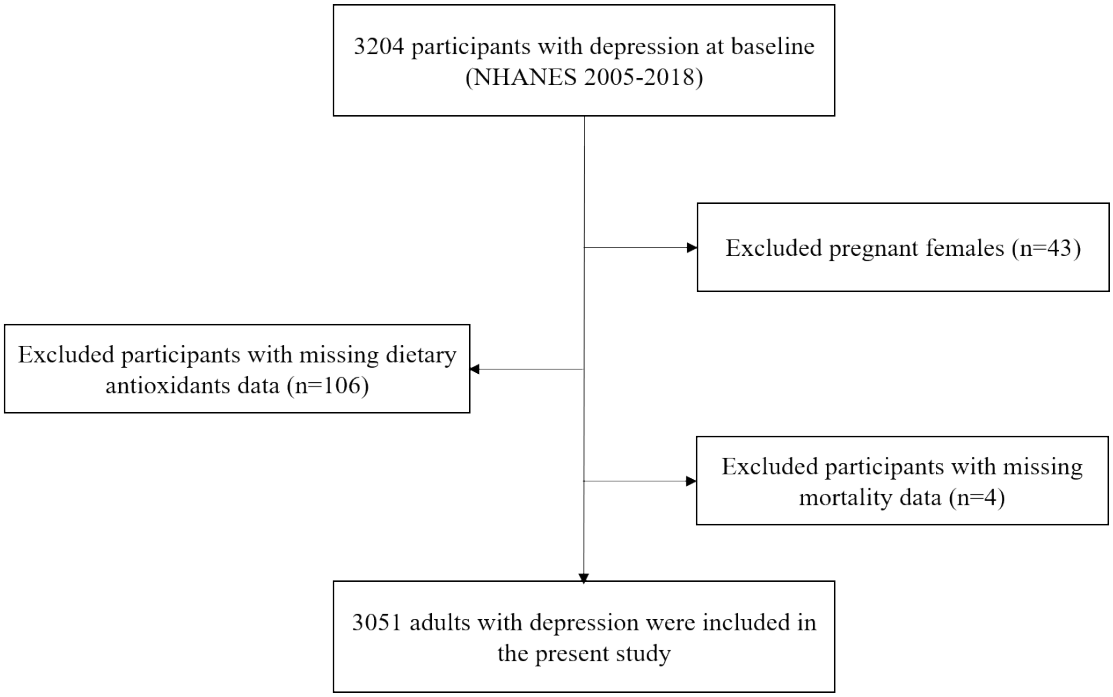
[b] All variables are represented as mean (standard error).

Supplementary Table 8 Differences in individual dietary antioxidant nutrients intake among adults with and without depression in the NHANES 2005-2018 [a]

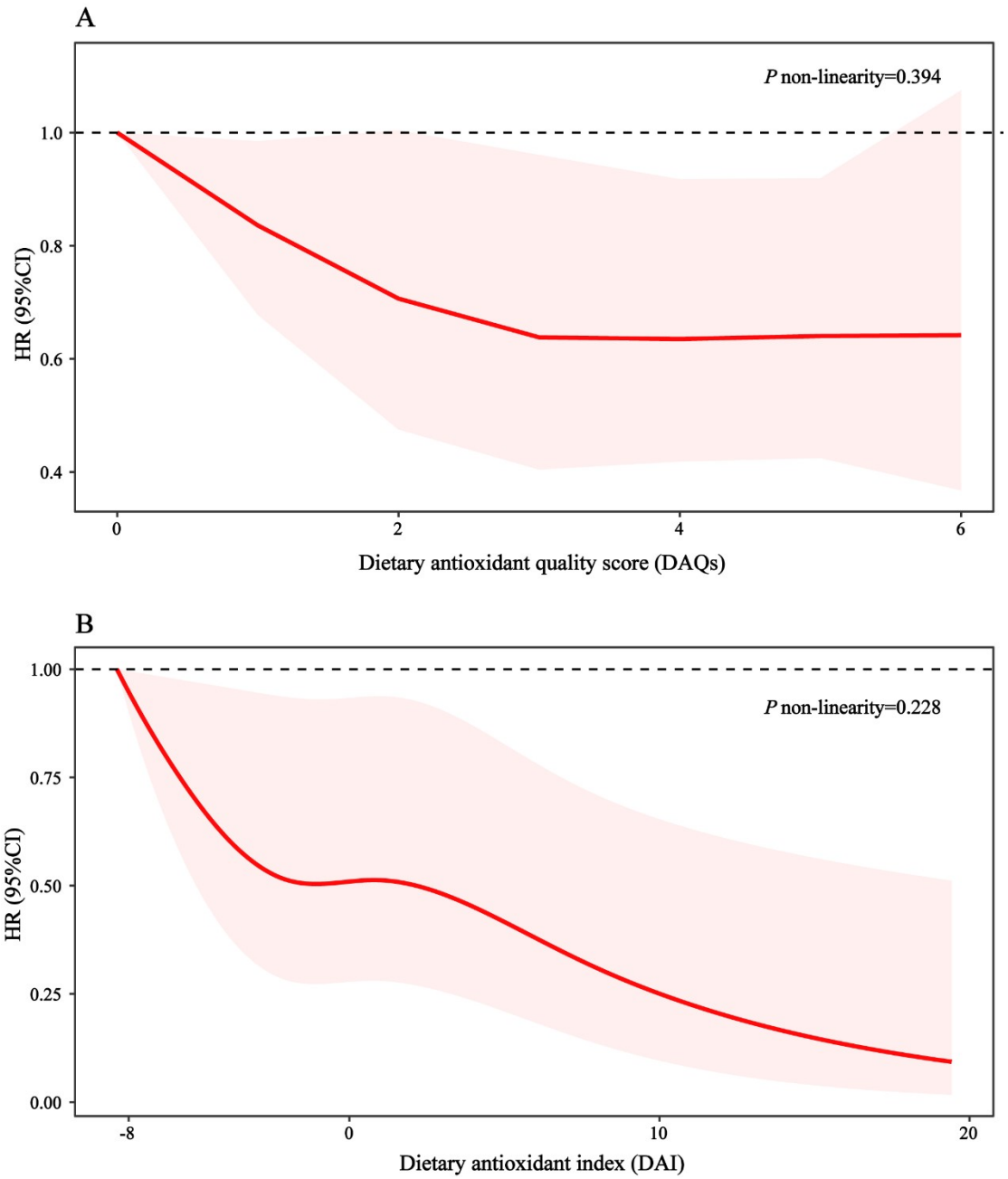
Characteristics [b]	Non-depression (n=3051)	Depression (n=3051)	*P*-value
Vitamin A (mg/day)	615.27(10.11)	553.14(11.55)	<0.001
Vitamin C (mg/day)	93.60(1.51)	70.98(1.38)	<0.001
Vitamin E (mg/day)	6.90(0.08)	6.97(0.09)	0.523
Magnesium (mg/day)	280.92(2.14)	259.16(2.24)	<0.001
Selenium (mcg/day)	104.15(0.86)	100.17(0.96)	0.001
Zinc (mg/day)	11.62(0.14)	10.17(0.11)	<0.001

[a] PHQ-9 scores ≥10 were considered to indicate individuals with depression. The control and depression groups were matched by sex and age (± 2 years), and the number of control and depression groups was 1:1.

[b] All variables are represented as mean (standard error).



Supplementary Figure 1 Flow chat of participants included in the present study



Supplementary Figure 2 Dose-response associations of dietary antioxidant quality score (DAQs) and dietary antioxidant index (DAI) with all-cause mortality in adults with depression from the NHANES 2005-2018.