Supplementary Table S1 Integrated model of "DDS x Smoking x Gender" 3-way interaction effects on cognitive impairment

Combination of DDS*Smoking*Gender	OR[95%CI]
Female, Non-smoker, Low DDS	1.00(ref.)
Female, Non-smoker, high DDS	0.91[0.85,0.96]***
Female, Smoker, Low DDS	0.86[0.77,0.97]**
Female, Smoker, high DDS	0.99[0.87,1.11]
Male, Non-smoker, Low DDS	0.79[0.73,0.86]***
Male, Non-smoker, high DDS	0.75[0.68,0.82]***
Male, Smoker, Low DDS	0.77[0.71,0.84]***
Male, Smoker, high DDS	0.74[0.68,0.80]***

Note: GEE = Generalized estimation equation; DDS = Dietary Diversity Score (0-7); High DDS = DDS ranged 4-7; Low DDS = DDS ranged 0-3; OR = Odds Ratio; CI = confidence interval; Covariates are the same as in Table 2. The ORs of covariates and waves are not listed. *p < .10. **p < .05. ***p < .01.

Supplementary Table S2 "Dietary-Smoking-Gender" 3-way interaction effects on cognitive impairment of older adults from the GEE Logit regression models in six waves of CLHLS (2002-2018) with eating frequency of each of the 7 foods (meat, fish and seafood, eggs, beans, sugar, tea, and garlic) as a dichotomous variable of dietary respectively.

Past dietary frequency around age 60	(1) Meat	(2) Fish or seafood	(3) Eggs	(4) Beans	(5) Sugar	(6) Tea	(7) Garlic
	OR[95%CI]	OR[95%CI]	OR[95%CI]	OR[95%CI]	OR[95%CI]	OR[95%CI]	OR[95%CI]
(1) All samples							
High frequency (Low#)	0.95[0.90,0.99]**	0.95[0.91,1.00]**	0.98[0.94,1.02]	0.96[0.91,1.00]*	1.06[1.01,1.11]**	0.92[0.87,0.96]***	0.96[0.92,1.00]*
Ever smoking (no#)	0.97[0.92,1.03]	0.97[0.92,1.03]	0.97[0.92,1.02]	0.97[0.92,1.02]	0.97[0.92,1.03]	0.98[0.93,1.03]	0.97[0.92,1.03]
Male (Female#)	0.81[0.77,0.86]***	0.81[0.77,0.86]***	0.81[0.77,0.86]***	0.81[0.77,0.86]***	0.81[0.77,0.86]***	0.82[0.77,0.86]***	0.81[0.77,0.86]***
Covariates	√	√	√	√	√	√	√
Waves (2002#)	√	√	√	√	√	√	√
(2) All samples							
High frequency (Low#)	0.91[0.86,0.97]***	0.92[0.86,0.97]***	0.95[0.89,1.00]*	0.93[0.88,0.99]**	1.03[0.97,1.10]	0.95[0.89,1.01]*	0.97[0.92,1.03]
Ever smoking (no#)	0.89[0.80,1.00]*	0.86[0.77,0.96]***	0.89[0.79,1.01]*	0.89[0.78,1.01]*	0.92[0.83,1.03]	0.96[0.87,1.07]	0.97[0.86,1.09]
Male (Female#)	0.77[0.71,0.84]***	0.77[0.71,0.84]***	0.78[0.71,0.85]***	0.79[0.73,0.87]***	0.78[0.72,0.84]***	0.83[0.77,0.90]***	0.81[0.74,0.88]***
High frequency×Smoking	1.17[1.00,1.38]*	1.33[1.13,1.58]***	1.15[0.97,1.35]	1.15[0.98,1.36]*	1.11[0.94,1.31]	0.98[0.82,1.17]	0.97[0.83,1.15]
High frequency×Male	1.09[0.97,1.23]	1.11[0.99,1.25]*	1.07[0.95,1.20]	1.03[0.92,1.16]	1.10[0.97,1.24]	0.91[0.81,1.04]	0.99[0.88,1.11]
Smoking×Male	1.12[0.96,1.30]	1.20[1.04,1.39]**	1.09[0.93,1.28]	1.09[0.92,1.28]	1.09[0.95,1.26]	1.02[0.89,1.18]	1.03[0.88,1.20]
High frequency×Smoking×Male	0.82[0.66,1.02]*	0.67[0.54,0.83]***	0.88[0.71,1.10]	0.89[0.72,1.11]	0.84[0.68,1.05]	1.04[0.83,1.31]	0.99[0.80,1.23]
Covariates	√	√	√	√	√	√	√
Waves (2002#)	√	√	√	√	√	√	√
(3) Males only							
High frequency (Low#)	0.97[0.87,1.08]	0.99[0.89,1.10]	0.99[0.89,1.10]	0.94[0.84,1.04]	1.11[0.99,1.23]*	0.85[0.76,0.95]***	0.95[0.85,1.05]
Ever smoking (no#)	0.99[0.89,1.09]	1.02[0.93,1.11]	0.96[0.86,1.07]	0.95[0.85,1.06]	0.99[0.90,1.08]	0.97[0.88,1.07]	0.99[0.89,1.09]
High frequency*Smoking	0.96[0.83,1.10]	0.89[0.77,1.02]*	1.01[0.88,1.16]	1.02[0.89,1.18]	0.93[0.81,1.08]	1.03[0.89,1.18]	0.96[0.84,1.10]
Covariates	√	√	√	√	√	√	√

Waves (2002[#])	√	√	√	√	√	√	√
(4) Females only							
High frequency (Low[#])	0.93[0.87,0.98]**	0.93[0.88,0.99]**	0.96[0.90,1.02]	0.95[0.89,1.01]*	1.05[0.98,1.11]	0.96[0.90,1.02]	0.98[0.92,1.04]
Ever smoking (no[#])	0.90[0.80,1.00]*	0.86[0.77,0.96]***	0.89[0.79,1.01]*	0.89[0.78,1.01]*	0.92[0.83,1.03]	0.97[0.87,1.07]	0.97[0.86,1.09]
High frequency×Smoking	1.17[0.99,1.38]*	1.33[1.13,1.58]***	1.15[0.97,1.35]	1.15[0.97,1.36]*	1.11[0.94,1.31]	0.98[0.82,1.17]	0.97[0.83,1.15]
Covariates	√	√	√	√	√	√	√
Waves (2002[#])	√	√	√	√	√	√	√

Note: GEE = Generalized estimation equation; OR = Odds Ratio; CI = confidence interval; [#]Denotes the reference group. Dependent variable "Cognitive Impairment (no[#])" uses cutoffs 16/17, 19/20, 23/24 for those without schooling, 1-6 years of education, and more than 6 years education, respectively. Covariates are the same as that of Table 3 including Age, East China (Middle/West[#]), Urban residence (Rural[#]), Married (Others[#]), Years of schooling, Number of family members, Log of income per capita, Poor self-rated health(good[#]) and Regular exercise (no[#]). Odds ratios of covariates and waves are not listed. *p < .10. **p < .05. ***p < .01.