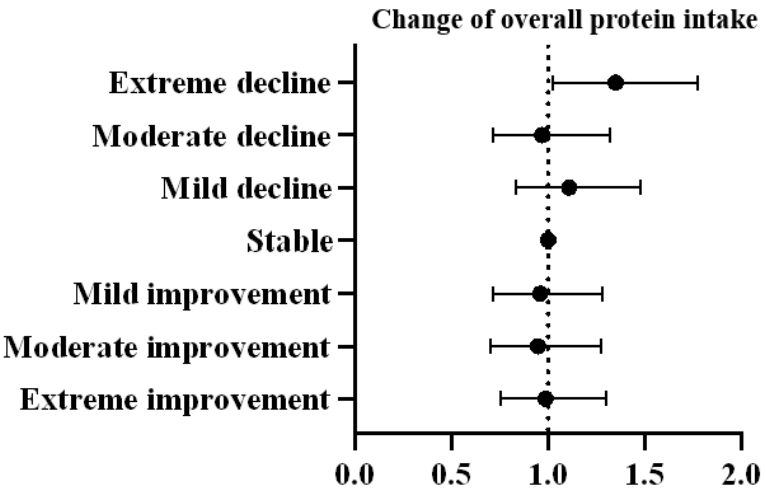

Figure S1. Association between the change patterns of overall protein intake and cognitive impairment based on restricted cubic spline model.

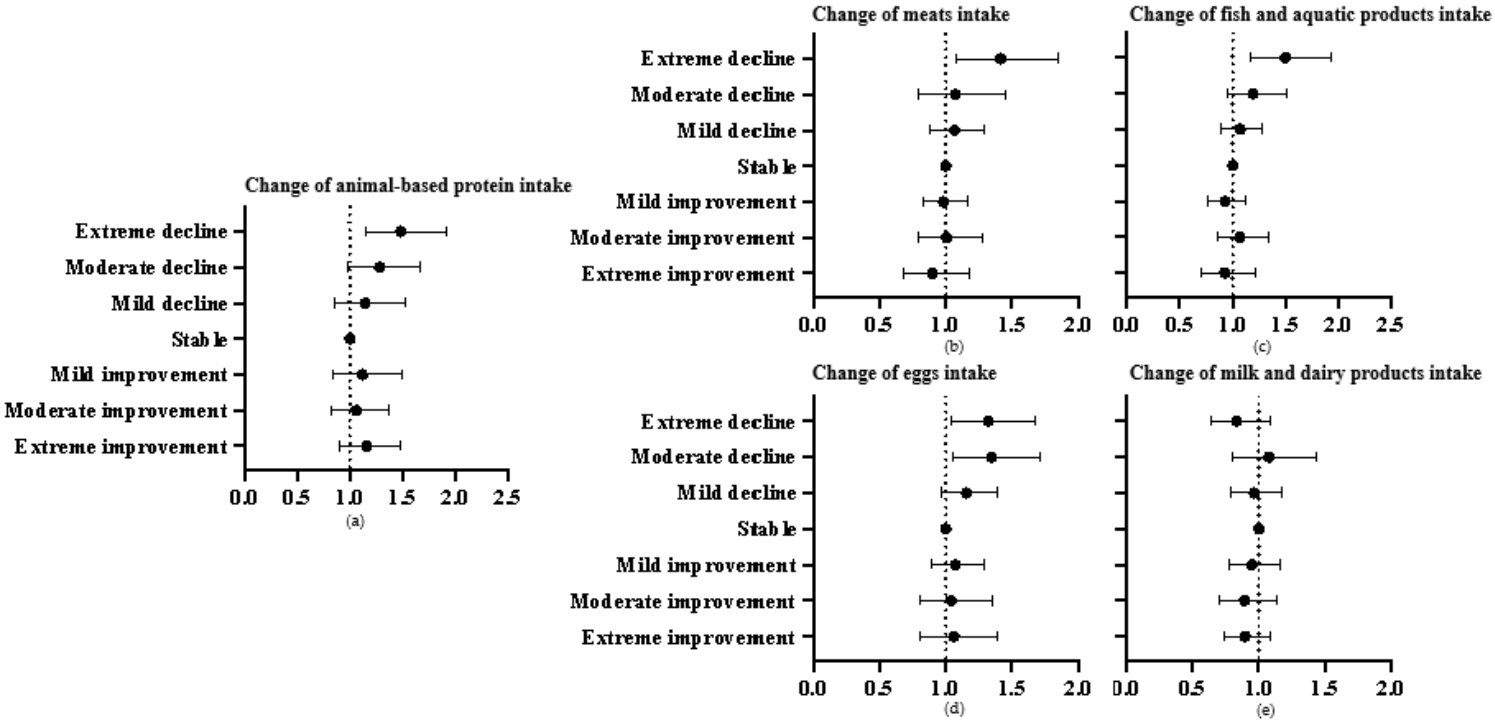

Figure S2. Association between the change patterns of protein intake and cognitive impairment based on restricted cubic spline model after adjusting for age (continuous), gender, residence, years of schooling, marital status, economic status, living pattern, tobacco smoking, alcohol drinking, regular exercise, ADL, IADL, BMI, chronic disease (hypertension, diabetes, heart disease, stroke or CVD, cataract, digestive system disease, arthritis, Parkinson's disease). (**a**) change in animal-based protein intake; (**b**) change in meats intake; (**c**) change in fish and aquatic products intake; (**d**) change in eggs intake; (**e**) change in milk and dairy products intake.

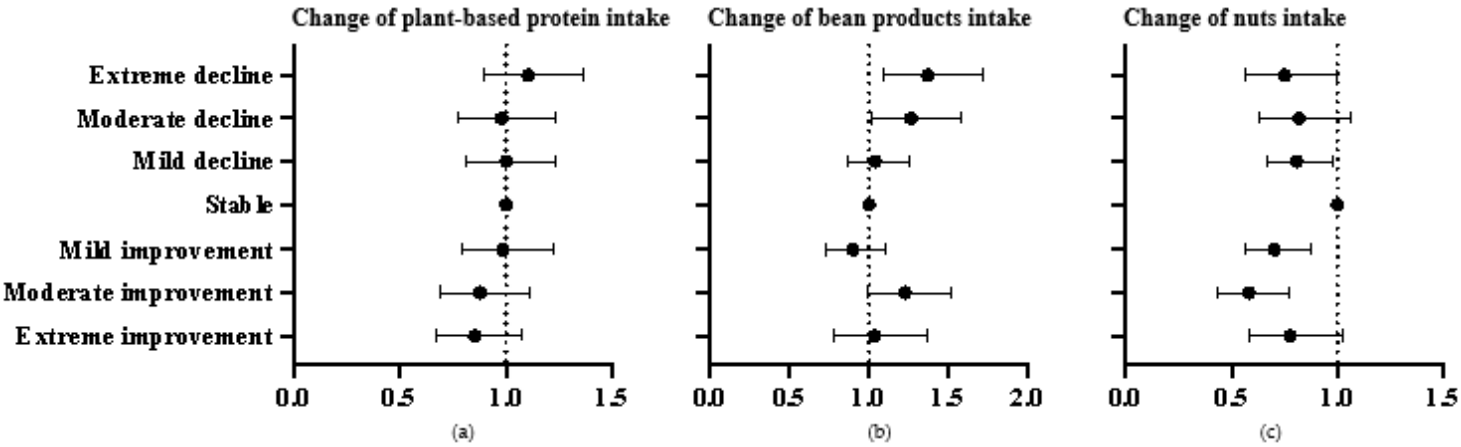

Figure S3. Association between the change patterns of protein intake and cognitive impairment based on restricted cubic spline model after adjusted for age (continuous), gender, residence, years of schooling, marital status, economic status, living pattern, tobacco smoking, alcohol drinking, regular exercise, ADL, IADL, BMI, chronic disease (hypertension, diabetes, heart disease, stroke or CVD, cataract, digestive system disease, arthritis, Parkinson's disease). (**a**) change in plant-based protein intake; (**b**) change in bean products intake; (**c**) change in nuts intake.

Table S1. The associations between changes in variables and cognitive impairment

Variables	HR (95% CI)	P value
Age in years	1.06 (1.05-1.07)	<0.001***
Sex		
Female	[1]	
Male	0.88 (0.72-1.07)	0.192
Years of schooling	0.93 (0.90-0.96)	<0.001***
Location of residence		
Rural	[1]	
Urban	0.98 (0.84-1.15)	0.828
Change in marital status		
Keep married	[1]	
Keep divorced/widowed/never	1.31 (1.04-1.66)	0.022*
From married to divorced/widowed	0.86 (0.64-1.16)	0.321
From divorced/widowed/never to married	1.17 (0.66-2.06)	0.591
Change in economic status		
Keep favorable	[1]	
Keep unfavorable	1.50 (1.07-2.11)	0.018*
From favorable to unfavorable	1.43 (1.14-1.79)	0.002**
From unfavorable to favorable	1.00 (0.998-1.002)	0.762
Change in living pattern		
Keep Living with family members	[1]	
Keep living alone or at nursing home	0.83 (0.63-1.09)	0.174
From living with family members to living alone or at nursing home	0.85 (0.63-1.14)	0.274
From living alone or at nursing home to living with family members	1.07 (0.84-1.35)	0.591
Change in ADL	1.06 (1.03-1.09)	<0.001***
Change in IADL	1.06 (1.05-1.08)	<0.001***
Change in BMI	1.00 (0.998-1.002)	0.762
Change in smoking status		
Keep smoking	[1]	
Keep not smoking	1.14 (0.86-1.52)	0.361
Quit smoking	1.19 (0.81-1.75)	0.385
Start smoking	1.12 (0.72-1.76)	0.613
Change in drinking alcohol status		
Keep drinking	[1]	
Keep not drinking	1.09 (0.79-1.50)	0.599
Quit drinking	1.07 (0.73-1.58)	0.719
Start drinking	1.10 (0.74-1.66)	0.634
Change in doing exercise status		
Keep exercising	[1]	
Keep not exercising	1.62 (1.22-2.15)	0.001**
Stop exercising	1.45 (1.07-1.98)	0.017*

Start exercising	1.79 (1.30-2.46)	<0.001***
Change in hypertension		
Keep having	[1]	
Keep not having	1.16 (0.91-1.48)	0.229
Recover	1.35 (0.98-1.85)	0.063
Start having	0.99 (0.75-1.32)	0.954
Change in diabetes		
Keep having	[1]	
Keep not having	0.85 (0.43-1.70)	0.654
Recover	0.74 (0.20-2.77)	0.653
Start having	0.51 (0.21-1.21)	0.125
Change in heart disease		
Keep having	[1]	
Keep not having	1.13 (0.75-1.69)	0.561
Recover	1.18 (0.69-2.02)	0.544
Start having	0.93 (0.58-1.49)	0.764
Change in stroke or CVD		
Keep having	[1]	
Keep not having	0.56 (0.32-0.99)	0.045*
Recover	0.55 (0.27-1.13)	0.105
Start having	0.63 (0.34-1.15)	0.132
Change in cataract		
Keep having	[1]	
Keep not having	1.07 (0.64-1.79)	0.791
Recover	1.37 (0.77-2.44)	0.287
Start having	1.04 (0.60-1.81)	0.889
Change in digestive system diseases		
Keep having	[1]	
Keep not having	0.72 (0.34-1.53)	0.395
Recover	0.56 (0.24-1.34)	0.192
Start having	0.61 (0.26-1.45)	0.262
Change in arthritis		
Keep having	[1]	
Keep not having	0.86 (0.58-1.27)	0.456
Recover	1.01 (0.67-1.54)	0.949
Start having	1.22 (0.78-1.92)	0.381
Change in Parkinson's disease		
Keep having	[1]	
Keep not having	0.17 (0.02-1.32)	0.090
Recover	0.28 (0.03-2.96)	0.290
Start having	0.13 (0.01-1.38)	0.091
Change in overall protein intake	0.95 (0.92-0.99)	0.008**

*p<0.05 **p<0.01 ***p<0.001

Table S2. The association between the change in different types of protein intake and cognitive impairment

	HR (95% CI)	P value
Animal-based protein	0.98 (0.96-0.997)	0.021*
Meats	0.96 (0.91-1.003)	0.066
Fish	0.95 (0.91-0.999)	0.045*
Eggs	0.94 (0.90-0.99)	0.014*
Milk* and *dairy products	1.00 (0.96-1.04)	0.945
Plant-based protein	0.96 (0.93-0.99)	0.007**
Bean products	0.93 (0.89-0.97)	0.002**
Nuts	0.98 (0.93-1.03)	0.433

*p<0.05 **p<0.01

Adjusted for baseline age (continuous), baseline gender, baseline residence, baseline years of schooling, change in marital status, change in economic status, change in living pattern, change in tobacco smoking, change in alcohol drinking, change in regular exercise, change in ADL, change in IADL, change in BMI, change in chronic disease (hypertension, diabetes, heart disease, stroke or CVD, cataract, digestive system disease, arthritis, Parkinson's disease).

Table S3. The association between the change in different types of protein intake between baseline and the first follow-up and cognitive impairment in the second follow-up.

	OR (95% CI)	P value
Total protein	0.99 (0.97-1.01)	0.373
Animal-based protein	0.99 (0.96-1.02)	0.498
Meats	0.92 (0.85-1.01)	0.070
Fish	0.92 (0.84-0.99)	0.034*
Eggs	0.97 (0.89-1.05)	0.396
Milk* and *dairy products	1.09 (1.02-1.17)	0.013*
Plant-based protein	0.98 (0.93-1.03)	0.393
Bean products	0.95 (0.88-1.02)	0.165
Nuts	1.01 (0.93-0.10)	0.841

*p<0.05

Adjusted for age (continuous), gender, residence, years of schooling, marital status, economic status, living pattern, tobacco smoking, alcohol drinking, regular exercise, ADL, IADL, BMI, chronic disease (hypertension, diabetes, heart disease, stroke or CVD, cataract, digestive system disease, arthritis, Parkinson's disease)