Online Supplementary Documents

Table S1 Association between social participation and cognitive function
using dataset with multiple imputation techniques (n=13,091)

	Total Score			Memory			Mental Status		
	All	Men	Women	All	Men	Women	All	Men	Women
	β (95% CI)	β (95% CI)	β (95% CI)	β (95% CI)	β (95% CI)	β (95% CI)	β (95% CI)	β (95% CI)	β (95% CI)
Variety (Ref: None)									
1 type	0.382***	0.407***	0.358***	0.254***	0.266***	0.244***	0.127***	0.141**	0.114**
	(0.272, 0.491)	(0.247, 0.567)	(0.208, 0.509)	(0.167, 0.342)	(0.139, 0.392)	(0.123, 0.365)	(0.067, 0.187)	(0.052, 0.231)	(0.034, 0.194)
≥ 2 types	0.673***	0.600***	0.753***	0.453***	0.406***	0.501***	0.221***	0.194**	0.251***
	(0.526, 0.821)	(0.394, 0.806)	(0.542, 0.963)	(0.335, 0.570)	(0.244, 0.568)	(0.331, 0.671)	(0.141, 0.301)	(0.079, 0.309)	(0.139, 0.364)
Frequency (Ref: None)									
Not regularly	0.324***	0.341***	0.307**	0.208***	0.206**	0.212*	0.115**	0.136*	0.095+
	(0.172, 0.448)	(0.149, 0.534)	(0.110, 0.504)	(0.099, 0.318)	(0.054, 0.357)	(0.054, 0.371)	(0.040, 0.190)	(0.028, 0.243)	(-0.010, 0.200)
≥ 1/week	0.531***	0.540***	0.524***	0.360***	0.370***	0.351***	0.171***	0.170***	0.193***
	(0.428, 0.661)	(0.369, 0.711)	(0.365, 0.683)	(0.267, 0.453)	(0.235, 0.505)	(0.223, 0.492)	(0.108, 0.235)	(0.074, 0.265)	(0.088, 0.258)
Interacting with friends (Ref: None)									
Not regularly	0.334***	0.326**	0.341**	0.208***	0.221**	0.196*	0.126**	0.105+	0.145**
	(0.187, 0.481)	(0.118, 0.535)	(0.135, 0.548)	(0.090, 0.325)	(0.057, 0.386)	(0.030, 0.363)	(0.046, 0.206)	(-0.012, 0.221)	(0.035, 0.255)
≥ 1/week	0.441***	0.475***	0.419***	0.294***	0.339***	0.265***	0.147***	0.136**	0.154***
	(0.322, 0.559)	(0.300, 0.650)	(0.258, 0.579)	(0.200, 0.388)	(0.201, 0.476)	(0.136, 0.394)	(0.082, 0.211)	(0.039, 0.234)	(0.068, 0.239)
Mah-jong, cards, chess or other clubs (Ref: None)									
Not regularly	0.222*	0.217+	0.220	0.183*	0.156	0.205	0.039	0.060	0.015
	(0.024, 0.420)	(-0.035, 0.469)	(-0.097, 0.537)	(0.025, 0.341)	(-0.042, 0.355)	(-0.050, 0.460)	(-0.069, 0.147)	(-0.080, 0.201)	(-0.154, 0.184)
≥ 1/week	0.448***	0.316*	0.606***	0.359***	0.218*	0.524***	0.089	0.099	0.082
	(0.251, 0.646)	(0.060, 0.572)	(0.300, 0.912)	(0.202, 0.517)	(0.016, 0.419)	(0.278, 0.770)	(-0.018, 0.196)	(-0.044, 0.241)	(-0.081, 0.245)

Voluntary activities (Ref: None)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Not regularly	0.275***	0.210+	0.350**	0.209**	0.172+	0.252*	0.065	0.038	0.097
	(0.112, 0.438)	(-0.012, 0.432)	(0.111, 0.589)	(0.079, 0.339)	(-0.003, 0.347)	(0.059, 0.444)	(-0.023, 0.154)	(-0.086, 0.162)	(-0.029, 0.225)
≥ 1/week	0.549***	0.775***	0.348+	0.350***	0.431**	0.286+	0.199**	0.343***	0.062
	(0.289, 0.808)	(0.408, 1.142)	(-0.019, 0.715)	(0.142, 0.557)	(0.142, 0.720)	(-0.010, 0.581)	(0.058, 0.340)	(0.139, 0.548)	(-0.133, 0.258)
Sports or social clubs (Ref: No)									
Yes	0.281**	0.013	0.479***	0.157+	0.007	0.265*	0.124*	0.005	0.214**
	(0.071, 0.491)	(-0.306, 0.331)	(0.199, 0.759)	(-0.010, 0.324)	(-0.243, 0.258)	(0.040, 0.490)	(0.009, 0.228)	(-0.173, 0.182)	(0.065, 0.363)
Internet (Ref: No)									
Yes	0.780***	0.793***	0.769*	0.584***	0.545**	0.656*	0.196+	0.248+	0.114
	(0.409, 1.150)	(0.321, 1.264)	(0.180, 1.359)	(0.288, 0.879)	(0.173, 0.916)	(0.181, 1.130)	(-0.005, 0.397)	(-0.015, 0.511)	(-0.200, 0.428)
Community organisations (Ref: No)									
Yes	0.387*	0.107	0.719**	0.146	0.068	0.238	0.241*	0.039	0.482***
	(0.031, 0.743)	(-0.364, 0.579)	(0.182, 1.257)	(-0.138, 0.430)	(-0.303, 0.439)	(-0.195, 0.670)	(0.048, 0.439)	(-0.224, 0.302)	(0.196, 0.768)

N.B. All models controlled time-varying variables, including year, education, marital status, living near children, retirement status, percapita household income, alcohol consumption, smoking, # of types of NCDs, and # of types of lower body constraints; + $P < 0.1$, * $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$.

Table S2 correlation and cross-sectional regression analysis of the relationship
between SP and cognitive function

	Correlation			Cross-sectional regression[‡]		
	Total Score	Memory	Mental Status	Total Score	Memory	Mental Status
	rho (z)	rho (z)	rho (z)	β (95% CI)	β (95% CI)	β (95% CI)
Variety						
None				1	1	1
1 type	0.195***	0.172***	0.150***	0.641***	0.395***	0.246***
	(>8.210)	(>8.210)	(>8.210)	(0.482, 0.799)	(0.282, 0.508)	(0.158, 0.333)
≥ 2 types				1.425***	0.873***	0.552***
				(1.246, 1.605)	(0.744, 1.002)	(0.453, 0.652)
Frequency						
None				1	1	1
Not regularly	0.164***	0.146***	0.125***	0.679***	0.409***	0.270***
	(>8.210)	(>8.210)	(>8.210)	(0.478, 0.880)	(0.265, 0.553)	(0.159, 0.381)
≥ 1/week				1.066***	0.658***	0.408***
				(0.914, 1.218)	(0.549, 0.767)	(0.324, 0.492)
Interacting with friends						
None				1	1	1
Not regularly	0.088***	0.089***	0.052***	0.539***	0.371***	0.168***
	(>8.210)	(>8.210)	(>8.210)	(0.325, 0.753)	(0.218, 0.524)	(0.050, 0.286)
≥ 1/week				0.713***	0.473***	0.239***
				(0.551, 0.874)	(0.358, 0.589)	(0.150, 0.329)
Mah-jong, cards, chess or other clubs						
None				1	1	1
Not regularly	0.141***	0.105***	0.131***	0.911***	0.469***	0.443***
	(>8.210)	(>8.210)	(>8.210)	(0.666, 1.157)	(0.293, 0.644)	(0.307, 0.578)
≥ 1/week				1.011***	0.580***	0.431***
				(0.805, 1.218)	(0.432, 0.728)	(0.317, 0.545)
Voluntary activities						
None				1	1	1
Not regularly	0.090***	0.091***	0.055***	0.770***	0.468***	0.302***
	(>8.210)	(>8.210)	(>8.210)	(0.532, 1.008)	(0.298, 0.639)	(0.170, 0.433)
≥ 1/week				0.690***	0.599***	0.091
				(0.317, 1.063)	(0.333, 0.866)	(-0.115, 0.296)
Sports or social clubs[†]						
No	-2.488***	-1.481***	-1.007***	1	1	1
Yes	(-22.002)	(-18.625)	(-17.309)	1.032***	0.678***	0.354***
				(0.772, 1.292)	(0.492, 0.864)	(0.211, 0.497)
Internet[†]						
No				1	1	1

Yes	-5.201***	-3.107***	-2.094***	1.721***	1.235***	0.485***
	(-38.456)	(-28.038)	(-33.305)	(1.283, 2.158)	(0.923, 1.548)	(0.244, 0.726)
Community organisations[†]						
No				1	1	1
Yes	-2.927***	-1.653***	-1.274***	1.303***	0.857***	0.447***
	(-14.750)	(-11.709)	(-13.036)	(0.838, 1.768)	(0.524, 1.189)	(0.191, 0.703)

N.B. [†]: results from t test in a form of difference in mean value (t); [‡]: the cross-sectional regression analysis was based on pooled data from 2011, 2013 and 2015. All regression models controlled time-varying and time-invariant variables, including gender, residency, year, age, education, marital status, living near children, retirement status, percapita household income, alcohol consumption, smoking, # of types of NCDs, and # of types of lower body constraints; $+ P < 0.1$, $* P < 0.05$, $** P < 0.01$, $*** P < 0.001$.