

Category

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eTable 1 Details of physical and mental activity-related items

Questions	Field code
Items of physical activity	
Leisure time activity	
In the last 4 weeks did you spend any time doing the following?	6164
How many times in the last 4 weeks did you do strenuous sports?	991
Each time you did strenuous sports, about how long did you spend doing it?	1001
How many times in the last 4 weeks did you do other exercises such as swimming, cycling, keep fit?	3637
Each time you did other exercises such as swimming, cycling, keep fit, about how long did you spend doing them?	3647
How many times in the last 4 weeks did you go walking for pleasure?	971
Each time you went walking for pleasure, about how long did you spend doing it?	981
At home, during the last 4 weeks, about how many times a DAY do you climb a flight of stairs?	943
Housework-related activity	
How many times in the last 4 weeks did you do heavy DIY?	2624
Each time you did heavy DIY, about how long did you spend doing it?	2634
How many times in the last 4 weeks did you do light DIY?	1011
Each time you did light DIY, about how long did you spend doing it?	1021
Job-related activity	
Which of the following describes your current situation?	6142
Does your work involve heavy manual or physical work?	816
Does your work involve walking or standing for most of the time?	806
Transportation for work	
What types of transport do you use to get to and from work?	6143
Transportation for others	
In the last 4 weeks, which forms of transport have you used most often to get about? (Not including any journeys to and from work)	6162
Items of mental activity	
Intelligence	
Which of the following qualifications do you have?	6138
Which of the following do you attend once a week or more often? (Adult education class)	6160
Social contact	
How often do you visit friends or family or have them visit you?	1031
Which of the following do you attend once a week or more often? (Pub or social club)	6160
Which of the following do you attend once a week or more often? (Religious group)	6160
Which of the following do you attend once a week or more often? (Other group activity)	6160
Use of electronic device	
Do you play computer games?	2237
Over the last 3 months, on average how much time per week did you spend making or receiving calls on a mobile phone?	1120
Time spent watching television	1070

eTable 2 Diagnosis codes used for outcomes and covariates identification in this study

International Classification of Diseases-10 (ICD-10)		
Outcomes		
Dementia	Vascular dementia	F01.0, F01.1, F01.2, F01.3, F01.8, F01.9, I67.3
	Alzheimer disease	F00.0, F00.1, F00.2, F00.9, G30.0, G30.1, G30.8, G30.9
	Frontotemporal dementia	F02.0, G31.0
	Other	A81.0, F02.1, F02.2, F02.3, F02.4, F02.8, F03, F05.1, F10.6, G31.1, G31.8
Charlson comorbidity index (CCI)		
Myocardial infarction		I21, I22, I252
Congestive heart failure		I110, I130, I132, I50
Peripheral vascular disease		I70, I71, I731, I738, I739, I771, I790, I792, K551, K558, K559, R02, Z958, Z959
Cerebrovascular disease		I60-I69, G45, G46
Chronic pulmonary disease		J40-J47, J60, J61, J62, J63, J64, J65, J66, J67, J684, J70, J841, J920, J961, J982
Connective tissue disease		M05, M06, M30, M315, M32, M33, M34, M351, M353, M360
Ulcer disease		K25, K26, K27, K28
Mild liver disease		B18, K700, K701, K702, K703, K709, K713, K714, K715, K717, K73, K74, K760, K762, K763, K764, K768, K769,
Diabetes mellitus		E100, E101, E106, E108, E109, E110, E111, E116, E118, E119, E120, E121, E126, E128, E129, E130, E131, E136, E138, E139, E140, E141, E146, E148, E149,
Hemiplegia		G041, G114, G801, G802, G81, G82, G839, G830, G831, G832, G833, G834
Moderate/severe renal disease		I120, I131, N032, N033, N034, N035, N036, N037, N052, N053, N054, N055, N056, N057, N18, N19, N250, Z940, Z992
Diabetes mellitus with chronic complications		E102, E103, E104, E105, E107, E112-E115, E122-E125, E132- E135, E142- E145, E117, E127, E137, E147
Any tumor		C00-C14, C15-C26, C30-C34, C37-C41, C43, C45-C49, C50-C50, C51-C58, C60-C63, C64-C68, C69-C72, C73-C76, C97
Leukemia		C91, C92, C93, C94, C95
Lymphoma		C81, C82, C83, C84, C85, C88, C90, C96
Moderate/severe liver disease		I85, K704, K72, K766
Metastatic solid tumor		C77, C78, C79, C80
AIDS		B20, B21, B22, B23, B24
Other somatic disease		
Hypertension		I10
hyperlipidemia		E78

eTable 3 Associations between physical activity items and dementia

Items of physical activity	Dementia	
	No. of cases/No. of Accumulated 1000*Person- Years (Incidence Rate)	HR (95%CI)*
Leisure time activity		
Vigorous sports (sports that make you sweat or breathe hard)		
No	4176/3979.82(1.05)	Ref
Yes	204/484.49(0.42)	0.85(0.74 - 0.98)
Frequency of vigorous sports		
None	4176/3979.82(1.05)	Ref
<1/week	40/97.19(0.41)	0.90(0.66 - 1.23)
1-3/week	127/304.26(0.42)	0.84(0.70 - 1.00)
≥4/week	37/83.03(0.45)	0.84(0.61 - 1.16)
Duration of vigorous sports		
None	4176/3979.82(1.05)	Ref
<0.5h	16/38.9(0.41)	0.87(0.53 - 1.43)
0.5-1.5h	119/344.37(0.35)	0.82(0.68 - 0.98)
>1.5h	70/101.73(0.69)	0.92(0.73 - 1.17)
Other exercises (e.g., swimming, cycling, keep fit, bowling)		
No	2740/2173(1.26)	Ref
Yes	1605/2273.45(0.71)	0.78(0.73 - 0.83)
Frequency of other exercises		
None	2740/2173(1.26)	Ref
<1/week	399/585(0.68)	0.82(0.73 - 0.91)
1-3/week	876/1275.23(0.69)	0.75(0.69 - 0.81)
≥4/week	330/413.22(0.8)	0.84(0.75 - 0.94)
Duration of other exercises		
None	2740/2173(1.26)	Ref
<0.5h	379/504.23(0.75)	0.81(0.73 - 0.91)
0.5-1.5h	910/1445.25(0.63)	0.78(0.72 - 0.84)
>1.5h	319/326.15(0.98)	0.77(0.68 - 0.86)
Walking for pleasure		
No	1164/1074.26(1.08)	Ref
Yes	3186/3379.39(0.94)	0.97(0.90 - 1.04)
Frequency of walking for pleasure		
None	1164/1074.26(1.08)	Ref
<1/week	880/1233.53(0.71)	0.88(0.81 - 0.96)
1-3/week	1230/1358.7(0.91)	0.90(0.83 - 0.98)
≥4/week	1076/787.15(1.37)	1.14(1.05 - 1.24)
Duration of walking for pleasure		
None	1164/1074.26(1.08)	Ref
<0.5h	859/799.22(1.07)	1.07(0.98 - 1.17)
0.5-1.5h	1638/1832.21(0.89)	0.95(0.88 - 1.02)

>1.5h	691/746.55(0.93)	0.90(0.81 - 0.99)
Frequency of stair climbing		
No	773/428.12(1.81)	Ref
Yes	4107/4327.67(0.95)	0.88(0.81 - 0.95)
Frequency of stair climbing		
None	773/428.12(1.81)	Ref
≤10 times/day	2643/2696.31(0.98)	0.88(0.81 - 0.95)
>10 times/day	1464/1631.36(0.9)	0.88(0.81 - 0.96)
Housework-related activity		
Light DIY (e.g., pruning, watering the lawn)		
No	2270/2068.27(1.1)	Ref
Yes	1944/2319.31(0.84)	0.86(0.81 - 0.92)
Frequency of light DIY		
None	2270/2068.27(1.1)	Ref
<1/week	713/901.7(0.79)	0.88(0.81 - 0.95)
1-3/week	884/1084.38(0.82)	0.86(0.79 - 0.93)
≥4/week	347/333.23(1.04)	0.84(0.75 - 0.94)
Duration of light DIY		
None	2270/2068.27(1.1)	Ref
<0.5h	661/683.13(0.97)	0.95(0.87 - 1.04)
0.5-1.5h	883/1115.47(0.79)	0.86(0.79 - 0.93)
>1.5h	393/509.13(0.77)	0.76(0.68 - 0.85)
Heavy DIY (e.g., weeding, lawn mowing, carpentry, digging)		
No	2603/2482.95(1.05)	Ref
Yes	1538/1839.03(0.84)	0.78(0.73 - 0.84)
Frequency of heavy DIY		
None	2603/2482.95(1.05)	Ref
<1/week	801/1020.53(0.78)	0.79(0.72 - 0.85)
1-3/week	626/718.62(0.87)	0.78(0.71 - 0.85)
≥4/week	111/99.88(1.11)	0.76(0.62 - 0.91)
Duration of heavy DIY		
None	2603/2482.95(1.05)	Ref
<0.5h	433/436.81(0.99)	0.83(0.75 - 0.92)
0.5-1.5h	670/838.36(0.8)	0.79(0.72 - 0.86)
>1.5h	453/566.89(0.8)	0.75(0.68 - 0.83)
Job-related activity		
Job involves heavy manual or physical work		
No	4709/3812.08(1.24)	Ref
Yes	372/984.73(0.38)	0.67(0.60 - 0.75)
Job involves heavy manual or physical work		
Never/rarely	4709/3812.08(1.24)	Ref
Sometimes	235/605.58(0.39)	0.71(0.62 - 0.81)
Usually	65/191.58(0.34)	0.56(0.44 - 0.72)
Always	72/187.57(0.38)	0.67(0.53 - 0.85)
Job involves mainly walking or standing		
No	4409/2973.25(1.48)	Ref
Yes	674/1823.12(0.37)	0.69(0.63 - 0.75)

Job involves mainly walking or standing

Never/rarely	4409/2973.25(1.48)	Ref
Sometimes	312/862.74(0.36)	0.76(0.67 - 0.85)
Usually	155/415.83(0.37)	0.68(0.58 - 0.80)
Always	207/544.56(0.38)	0.61(0.53 - 0.70)

Transportation for work**Walk**

No	4840/4157.41(1.16)	Ref
Yes	136/414.04(0.33)	0.77(0.65 - 0.92)

Public

No	4787/4004.98(1.2)	Ref
Yes	189/566.46(0.33)	0.74(0.64 - 0.86)

Cycle

No	4939/4372.92(1.13)	Ref
Yes	37/198.53(0.19)	0.59(0.43 - 0.82)

Car

No	4314/2522.08(1.71)	Ref
Yes	662/2049.37(0.32)	0.69(0.63 - 0.75)

Transportation for others**Walk**

No	2621/2446.26(1.07)	Ref
Yes	2315/2323.12(1)	0.95(0.90 - 1.01)

Public

No	2839/3311.44(0.86)	Ref
Yes	2097/1457.94(1.44)	1.09(1.03 - 1.15)

Cycle

No	4735/4431.81(1.07)	Ref
Yes	201/337.57(0.6)	0.78(0.67 - 0.90)

Car

No	1480/1026.56(1.44)	Ref
Yes	3456/3742.81(0.92)	0.82(0.77 - 0.87)

CI, confidence interval; HR, hazard ratio; Ref, reference.

* HRs (95%CI) were derived from Cox regression models, adjusted for age, sex, ethnicity, Townsend deprivation index, education, income, body mass index, smoking status, alcohol status, Charlson comorbidity index, history of hypertension, history of hyperlipidemia, and family history of dementia.

eTable 4 Associations between mental activity items and dementia

Items of mental activity	Dementia	
	No. of cases/No. of	HR (95%CI)*
	Accumulated 1000*Person-Years (Incidence Rate)	
Intelligence		
Attendance of adult education classes		
No	3094/3014.26(1.03)	Ref
Yes	315/352.01(0.89)	0.88(0.78 - 0.99)
With college/university degree		
No	2113/2373.72(0.89)	Ref
Yes	997/1565.33(0.64)	0.95(0.88 - 1.03)
Educational level		
Other professional qualifications	315/247.96(1.27)	Ref
NVQ or HND or HNC or equivalent	377/314(1.2)	1.06(0.91 - 1.23)
CSEs or equivalent	109/260.4(0.42)	0.88(0.71 - 1.10)
O levels/GCSEs or equivalent	880/1016.09(0.87)	0.97(0.85 - 1.10)
A levels/AS levels or equivalent	432/535.28(0.81)	1.13(0.98 - 1.31)
College or University degree	997/1565.33(0.64)	0.97(0.85 - 1.10)
Social contact		
Attending Religious activity		
No	2456/2605.12(0.94)	Ref
Yes	953/761.15(1.25)	1.11(1.03 - 1.20)
Pub or social club visit		
No	2030/2094.83(0.97)	Ref
Yes	1379/1271.44(1.08)	1.07(0.99 - 1.15)
Attending other group activity		
No	2304/2316.62(0.99)	Ref
Yes	1105/1049.65(1.05)	0.91(0.85 - 0.98)
Attendance and frequency of friend/family visit		
No	165/81.13(2.03)	Ref
Yes	4810/4689.02(1.03)	0.66(0.56 - 0.77)
Attendance and frequency of friend/family visit		
never or almost/never	165/81.13(2.03)	Ref
Once every few months	356/317.89(1.12)	0.81(0.67 - 0.98)
About once a month	527/641.14(0.82)	0.64(0.54 - 0.77)
About once a week	1451/1706.05(0.85)	0.61(0.51 - 0.71)
2-4 times a week	1761/1467.46(1.2)	0.70(0.59 - 0.82)
Almost daily	715/556.49(1.28)	0.64(0.54 - 0.76)
Use of electronic device		
Playing computer games		
No	4211/3818.11(1.1)	Ref
Yes	889/1021.49(0.87)	0.94(0.87 - 1.01)
Playing computer games		

Never/rarely	4211/3817.89(1.1)	Ref
Sometimes	739/859.3(0.86)	0.95(0.88 - 1.02)
Often	150/162.12(0.93)	0.90(0.76 - 1.06)
Making or receiving calls on a mobile phone		
No	1114/852.91(1.31)	Ref
Yes	2448/3170.63(0.77)	0.95(0.88 - 1.02)
Making or receiving calls on a mobile phone		
0 less than 5 minutes	1114/852.91(1.31)	Ref
5-29 minus	1451/1566.3(0.93)	0.94(0.87 - 1.01)
30-59 minus	497/689.92(0.72)	0.92(0.83 - 1.02)
1-3 hours	348/572.94(0.61)	1.01(0.89 - 1.14)
4-6 hours	91/167.61(0.54)	1.14(0.92 - 1.40)
More than 6 hours	61/173.86(0.35)	0.93(0.72 - 1.20)
Watching TV	4871/4575.87(67.41)	1.07(1.05 - 1.09)

CI, confidence interval; HR, hazard ratio; Ref, reference.

*HRs (95% CIs) were derived from Cox regression models, adjusted for age, sex, ethnicity, Townsend deprivation index, education, income, body mass index, smoking status, alcohol status, Charlson comorbidity index, history of hypertension, history of hyperlipidemia, and family history of dementia.

eTable 5 Associations between physical and mental activity patterns and dementia, by age group at baseline

Principal components	≤65 years		>65 years	
	No. of cases/No. of Accumulated	HR (95%CI)*	No. of cases/No. of Accumulated	HR (95%CI)*
	1000*		1000*	
	Person-Years (Incidence Rate)		Person-Years (Incidence Rate)	
Physical activity				
PC1_more related to “vigorous and other exercise at leisure time”				
Low (<1st tertile)	976/1025.17(0.95)	Ref	1097/277.52(3.95)	Ref
Moderate (1st-2nd tertile)	557/1139.44(0.49)	0.74(0.67 - 0.83)	477/173.96(2.74)	0.76(0.68 - 0.85)
High (>2nd tertile)	351/1231.38(0.29)	0.62(0.55 - 0.71)	254/102.44(2.48)	0.71(0.61 - 0.81)
PC2_more related to “housework-related activity”				
Low (<1st tertile)	713/1152.98(0.62)	Ref	639/167.62(3.81)	Ref
Moderate (1st-2nd tertile)	599/1129.03(0.53)	0.85(0.76 - 0.95)	625/180.42(3.46)	0.99(0.88 - 1.10)
High (>2nd tertile)	572/1113.98(0.51)	0.77(0.69 - 0.86)	564/205.88(2.74)	0.81(0.72 - 0.91)
PC3_more related to “transport-related activity”				
Low (<1st tertile)	448/1261.33(0.36)	Ref	230/64.7(3.55)	Ref
Moderate (1st-2nd tertile)	642/1112.14(0.58)	1.16(1.02 - 1.31)	710/208.86(3.4)	0.98(0.84 - 1.14)
High (>2nd tertile)	794/1022.52(0.78)	1.22(1.08 - 1.38)	888/280.35(3.17)	0.92(0.80 - 1.07)
PC4_more related to “job-related activity”				
Low (<1st tertile)	671/1070.27(0.63)	Ref	768/240.41(3.19)	Ref
Moderate (1st-2nd tertile)	698/1090.68(0.64)	1.05(0.94 - 1.17)	752/222.27(3.38)	1.06(0.96 - 1.17)
High (>2nd tertile)	515/1235.03(0.42)	0.94(0.83 - 1.06)	308/91.25(3.38)	1.02(0.89 - 1.17)
PC5_more related to “walking for pleasure”				
Low (<1st tertile)	602/1128.35(0.53)	Ref	637/183.89(3.46)	Ref
Moderate (1st-2nd tertile)	681/1095.96(0.62)	1.1(0.98 - 1.23)	614/209.85(2.93)	0.90(0.8 - 1.00)
High (>2nd tertile)	601/1171.68(0.51)	1.07(0.95 - 1.2)	577/160.19(3.6)	1.09(0.97 - 1.22)
Mental activity				
PC1_more related to “pub or social club visit”				
Low (<1st tertile)	287/658.2(0.44)	Ref	222/92.19(2.41)	Ref
Moderate (1st-2nd tertile)	280/631.53(0.44)	1.03(0.87 - 1.23)	214/77.52(2.76)	1.07(0.88 - 1.31)
High (>2nd tertile)	320/715.42(0.45)	1.00(0.83 - 1.21)	231/68.78(3.36)	1.20(0.97 - 1.48)
PC2_more related to “watching TV”				

Low (<1st tertile)	208/714.64(0.29)	Ref	71/32.64(2.17)	Ref
Moderate (1st-2nd tertile)	263/684.01(0.38)	0.89(0.74 - 1.08)	202/70.06(2.88)	1.27(0.97 - 1.68)
High (>2nd tertile)	416/606.5(0.69)	1.03(0.85 - 1.24)	394/135.79(2.9)	1.16(0.88 - 1.52)

PC3_more related to

**“attending other group
activity/adult education
classes”**

Low (<1st tertile)	337/658.06(0.51)	Ref	270/89.4(3.02)	Ref
Moderate (1st-2nd tertile)	254/686.8(0.37)	0.89(0.75 - 1.05)	165/63.4(2.6)	0.90(0.74 - 1.09)
High (>2nd tertile)	296/660.3(0.45)	0.95(0.81 - 1.11)	232/85.69(2.71)	0.97(0.81 - 1.16)

PC4_more related to

“friend/family visit”

Low (<1st tertile)	344/665.41(0.52)	Ref	257/81.26(3.16)	Ref
Moderate (1st-2nd tertile)	275/669.14(0.41)	0.85(0.73 - 1.00)	216/79.16(2.73)	0.90(0.75 - 1.08)
High (>2nd tertile)	268/670.6(0.4)	0.84(0.72 - 0.99)	194/78.06(2.49)	0.85(0.70 - 1.02)

CI, confidence interval; HR, hazard ratio; Ref, reference.

*HRs (95%CIs) were derived from Cox regression models, adjusted for age, sex, ethnicity, Townsend deprivation index, education, income, body mass index, smoking status, alcohol status, Charlson comorbidity index, history of hypertension, history of hyperlipidemia, and family history of dementia.

eTable 6 Associations between physical and mental activity patterns and dementia, by sex

Principal components	Female		Male	
	No. of cases/No. of Accumulated 1000*Person-Years (Incidence Rate)	HR (95%CI)*	No. of cases/No. of Accumulated 1000*Person-Years (Incidence Rate)	HR (95%CI)*
Physical activity				
PC1_more related to “vigorous and other exercise at leisure time”				
Low (<1st tertile)	972/778.72(1.25)	Ref	1101/524.01(2.1)	Ref
Moderate (1st-2nd tertile)	473/754.64(0.63)	0.72(0.64 - 0.8)	561/558.83(1)	0.77(0.69 - 0.85)
High (>2nd tertile)	184/592.96(0.31)	0.60(0.51 - 0.70)	421/740.89(0.57)	0.66(0.59 - 0.75)
PC2_more related to “housework-related activity”				
Low (<1st tertile)	707/797.47(0.89)	Ref	645/523.17(1.23)	Ref
Moderate (1st-2nd tertile)	532/721.65(0.74)	0.86(0.77 - 0.97)	692/587.86(1.18)	0.95(0.85 - 1.06)
High (>2nd tertile)	390/607.2(0.64)	0.75(0.66 - 0.85)	746/712.69(1.05)	0.79(0.71 - 0.89)
PC3_more related to “transport-related activity”				
Low (<1st tertile)	240/645.84(0.37)	Ref	438/680.26(0.64)	Ref
Moderate (1st-2nd tertile)	611/745.48(0.82)	1.08(0.92 - 1.26)	741/575.53(1.29)	1.11(0.99 - 1.26)
High (>2nd tertile)	778/734.99(1.06)	1.02(0.88 - 1.19)	904/567.94(1.59)	1.13(1.00 - 1.28)
PC4_more related to “job-related activity”				
Low (<1st tertile)	632/716.01(0.88)	Ref	807/594.71(1.36)	Ref
Moderate (1st-2nd tertile)	668/720.83(0.93)	1.05(0.94 - 1.17)	782/592.16(1.32)	1.04(0.94 - 1.15)
High (>2nd tertile)	329/689.48(0.48)	0.88(0.77 - 1.02)	494/636.86(0.78)	1.01(0.89 - 1.13)
PC5_more related to “walking for pleasure”				
Low (<1st tertile)	498/658.95(0.76)	Ref	741/653.36(1.13)	Ref
Moderate (1st-2nd tertile)	607/732.87(0.83)	1.04(0.93 - 1.17)	688/573(1.2)	0.96(0.87 - 1.07)
High (>2nd tertile)	524/734.51(0.71)	1.16(1.02 - 1.31)	654/597.37(1.09)	1.03(0.92 - 1.14)
Mental activity				
PC1_more related to “pub or social club visit”				

Low (<1st tertile)	300/500.53(0.6)	Ref	209/249.83(0.84)	Ref
Moderate (1st-2nd tertile)	246/408.65(0.6)	1.04(0.87 - 1.25)	248/300.39(0.83)	1.06(0.87 - 1.29)
High (>2nd tertile)	179/314.35(0.57)	1.16(0.95 - 1.42)	372/469.84(0.79)	1.03(0.85 - 1.25)
PC2_more related to “watching TV”				
Low (<1st tertile)	102/339.59(0.3)	Ref	177/407.67(0.43)	Ref
Moderate (1st-2nd tertile)	206/411.75(0.5)	0.93(0.73 - 1.19)	259/342.31(0.76)	1.03(0.85 - 1.26)
High (>2nd tertile)	417/472.2(0.88)	0.88(0.69 - 1.12)	393/270.07(1.46)	1.19(0.97 - 1.45)
PC3_more related to “attending other group activity/adult education classes”				
Low (<1st tertile)	286/421.28(0.68)	Ref	321/326.16(0.98)	Ref
Moderate (1st-2nd tertile)	168/359.25(0.47)	0.99(0.81 - 1.20)	251/390.94(0.64)	0.83(0.70 - 0.98)
High (>2nd tertile)	271/443(0.61)	0.97(0.82 - 1.15)	257/302.94(0.85)	0.95(0.80 - 1.13)
PC4_more related to “friend/family visit”				
Low (<1st tertile)	263/381.26(0.69)	Ref	338/365.39(0.93)	Ref
Moderate (1st-2nd tertile)	230/399.87(0.58)	0.90(0.75 - 1.07)	261/348.41(0.75)	0.85(0.72 - 1.00)
High (>2nd tertile)	232/442.41(0.52)	0.85(0.71 - 1.01)	230/306.24(0.75)	0.85(0.72 - 1.00)

CI, confidence interval; HR, hazard ratio; Ref, reference.

*HRs (95%CI) were derived from Cox regression models, adjusted for age, sex, ethnicity, Townsend deprivation index, education, income, body mass index, smoking status, alcohol status, Charlson comorbidity index, history of hypertension, history of hyperlipidemia, and family history of dementia.

eTable 7 Associations between physical and mental activity patterns and dementia, by income level

Principal components	< £18, 000		£18, 000-£51, 999		≥£52, 000	
	No. of cases/No. of Accumulated 1000*Person-Years (Incidence Rate)	HR (95%CI)*	No. of cases/No. of Accumulated 1000*Person-Years (Incidence Rate)	HR (95%CI)*	No. of cases/No. of Accumulated 1000*Person-Years (Incidence Rate)	HR (95%CI)*
Physical activity						
PC1_more related to “vigorous and other exercise at leisure time”						
Low (<1st tertile)	819/365.45(2.24)	Ref	659/540.96(1.22)	Ref	85/185.13(0.46)	Ref
Moderate (1st-2nd tertile)	322/218.37(1.47)	0.80(0.70 - 0.91)	432/632.21(0.68)	0.75(0.66 - 0.85)	80/297.57(0.27)	0.77(0.56 - 1.04)
High (>2nd tertile)	148/134.91(1.1)	0.72(0.61 - 0.87)	293/625.68(0.47)	0.64(0.56 - 0.74)	70/451.22(0.16)	0.61(0.44 - 0.84)
PC2_more related to “housework-related activity”						
Low (<1st tertile)	518/268.87(1.93)	Ref	420/563.6(0.75)	Ref	77/293.06(0.26)	Ref
Moderate (1st-2nd tertile)	402/231.57(1.74)	0.85(0.74 - 0.97)	492/601.16(0.82)	0.94(0.83 - 1.08)	83/322.02(0.26)	0.94(0.69 - 1.29)
High (>2nd tertile)	369/218.29(1.69)	0.82(0.71 - 0.94)	472/634.09(0.74)	0.73(0.63 - 0.83)	75/318.84(0.24)	0.73(0.53 - 1.01)
PC3_more related to “transport-related activity”						
Low (<1st tertile)	200/164.37(1.22)	Ref	313/682.53(0.46)	Ref	60/341.51(0.18)	Ref
Moderate (1st-2nd tertile)	444/242.92(1.83)	0.96(0.81 - 1.14)	504/572.27(0.88)	1.08(0.93 - 1.25)	99/334.6(0.3)	1.42(1.03 - 1.98)
High (>2nd tertile)	645/311.44(2.07)	1.06(0.90 - 1.25)	567/544.04(1.04)	0.99(0.85 - 1.15)	76/257.81(0.29)	1.06(0.74 - 1.52)
PC4_more related to “job-related activity”						
Low (<1st tertile)	493/241.97(2.04)	Ref	544/568.6(0.96)	Ref	92/321.53(0.29)	Ref
Moderate (1st-2nd tertile)	520/254.46(2.04)	1.05(0.92 - 1.18)	515/586.04(0.88)	1.01(0.89 - 1.14)	78/299.88(0.26)	0.91(0.67 - 1.23)
High (>2nd tertile)	276/222.3(1.24)	0.94(0.81 - 1.10)	325/644.2(0.5)	1.00(0.86 - 1.15)	65/312.51(0.21)	0.89(0.64 - 1.25)

PC5_more related to**“walking for pleasure”**

Low (<1st tertile)	467/258.37(1.81)	Ref	440/590.21(0.75)	Ref	70/301.7(0.23)	Ref
Moderate (1st-2nd tertile)	466/252.18(1.85)	1.02(0.90 - 1.16)	459/589.38(0.78)	0.92(0.81 - 1.05)	87/294.17(0.3)	1.21(0.88 - 1.66)
High (>2nd tertile)	356/208.18(1.71)	1.02(0.89 - 1.17)	485/619.25(0.78)	1.10(0.96 - 1.25)	78/338.05(0.23)	1.10(0.79 - 1.52)

Mental activity**PC1_more related to****“pub or social club visit”**

Low (<1st tertile)	96/92.64(1.04)	Ref	263/348.29(0.76)	Ref	65/231.27(0.28)	Ref
Moderate (1st-2nd tertile)	149/96.84(1.54)	1.58(1.21 - 2.07)	219/332.36(0.66)	0.92(0.76 - 1.11)	39/201.8(0.19)	0.80(0.53 - 1.21)
High (>2nd tertile)	195/119.33(1.63)	1.67(1.26 - 2.22)	225/390.81(0.58)	0.86(0.70 - 1.06)	47/192.56(0.24)	1.12(0.73 - 1.74)

PC2_more related to**“watching TV”**

Low (<1st tertile)	49/55.26(0.89)	Ref	131/309.06(0.42)	Ref	64/329.03(0.19)	Ref
Moderate (1st-2nd tertile)	122/91.21(1.34)	1.16(0.83 - 1.62)	222/385.83(0.58)	0.97(0.78 - 1.21)	53/200.2(0.26)	1.00(0.69 - 1.46)
High (>2nd tertile)	269/162.34(1.66)	1.12(0.81 - 1.56)	354/376.56(0.94)	1.11(0.89 - 1.39)	34/96.4(0.35)	1.01(0.64 - 1.62)

PC3_more related to**“attending other group
activity/adult education
classes”**

Low (<1st tertile)	179/117.34(1.53)	Ref	265/367.57(0.72)	Ref	54/174.8(0.31)	Ref
Moderate (1st-2nd tertile)	129/85.11(1.52)	1.05(0.83 - 1.32)	183/349.08(0.52)	0.85(0.71 - 1.03)	47/244.43(0.19)	0.70(0.47 - 1.04)
High (>2nd tertile)	132/106.36(1.24)	0.84(0.67 - 1.06)	259/354.81(0.73)	1.06(0.89 - 1.26)	50/206.4(0.24)	0.75(0.51 - 1.12)

PC4_more related to**“friend/family visit”**

Low (<1st tertile)	165/112.41(1.47)	Ref	278/354.92(0.78)	Ref	54/197.3(0.27)	Ref
Moderate (1st-2nd tertile)	153/95.82(1.6)	1.09(0.87 - 1.36)	208/357.63(0.58)	0.77(0.65 - 0.93)	48/216.33(0.22)	0.84(0.57 - 1.24)
High (>2nd tertile)	122/100.58(1.21)	0.89(0.70 - 1.12)	221/358.91(0.62)	0.85(0.71 - 1.01)	49/212.01(0.23)	0.83(0.56 - 1.22)

CI, confidence interval; HR, hazard ratio; Ref, reference.

*HRs (95%CI) were derived from Cox regression models, adjusted for age, sex, ethnicity, Townsend deprivation index, education, income, body mass index, smoking status, alcohol status, Charlson comorbidity index, history of hypertension, history of hyperlipidemia, and family history of dementia.

eTable 8 Associations of physical and mental activity patterns with dementia among APOE ε4 carriers and noncarriers

Principal components	APOE ε4 carriers		Non-APOE ε4 carriers	
	No. of cases/No. of Accumulated 1000*Person-Years (Incidence Rate)	HR (95%CI)*	No. of cases/No. of Accumulated 1000*Person-Years (Incidence Rate)	HR (95%CI)*
Physical activity				
PC1_more related to “vigorous and other exercise at leisure time”				
Low (<1st tertile)	873/275.88(3.16)	Ref	825/782.54(1.05)	Ref
Moderate (1st-2nd tertile)	475/285.55(1.66)	0.79(0.71 - 0.89)	408/811.8(0.5)	0.72(0.64 - 0.81)
High (>2nd tertile)	254/298.7(0.85)	0.63(0.54 - 0.72)	270/823.92(0.33)	0.68(0.59 - 0.78)
PC2_more related to “housework-related activity”				
Low (<1st tertile)	532/268.99(1.98)	Ref	531/757.96(0.7)	Ref
Moderate (1st-2nd tertile)	548/287.33(1.91)	0.96(0.85 - 1.08)	485/813.19(0.6)	0.86(0.76 - 0.97)
High (>2nd tertile)	522/303.82(1.72)	0.82(0.72 - 0.93)	487/847.11(0.57)	0.77(0.68 - 0.88)
PC3_more related to “transport-related activity”				
Low (<1st tertile)	291/286.57(1.02)	Ref	282/811.49(0.35)	Ref
Moderate (1st-2nd tertile)	580/291(1.99)	1.00(0.86 - 1.15)	570/817.84(0.7)	1.18(1.02 - 1.37)
High (>2nd tertile)	731/282.56(2.59)	0.99(0.86 - 1.14)	651/788.92(0.83)	1.13(0.98 - 1.31)
PC4_more related to “job-related activity”				
Low (<1st tertile)	628/290.07(2.16)	Ref	610/823.4(0.74)	Ref
Moderate (1st-2nd tertile)	649/289.96(2.24)	1.11(1.00 - 1.24)	567/815.43(0.7)	0.99(0.88 - 1.11)
High (>2nd tertile)	325/280.1(1.16)	0.97(0.85 - 1.12)	326/779.44(0.42)	0.94(0.82 - 1.08)
PC5_more related to “walking for pleasure”				
Low (<1st tertile)	511/274.84(1.86)	Ref	520/781.74(0.67)	Ref
Moderate (1st-2nd tertile)	571/285.69(2)	1.00(0.89 - 1.13)	506/805.7(0.63)	0.94(0.83 - 1.06)
High (>2nd tertile)	520/299.61(1.74)	1.07(0.94 - 1.21)	477/830.82(0.57)	1.04(0.91 - 1.17)
Mental activity				
PC1_more related to “pub or social club visit”				
Low (<1st tertile)	193/153.68(1.26)	Ref	207/431.42(0.48)	Ref
Moderate (1st-2nd tertile)	202/153.74(1.31)	0.95(0.79 - 1.14)	185/424.35(0.44)	0.95(0.79 - 1.14)
High (>2nd tertile)	233/176.19(1.32)	0.96(0.79 - 1.17)	244/497.29(0.49)	0.96(0.79 - 1.17)
PC2_more related to “watching TV”				
Low (<1st tertile)	100/158.1(0.63)	Ref	112/431.75(0.26)	Ref
Moderate (1st-2nd tertile)	187/162.38(1.15)	1.04(0.84 - 1.28)	192/457.63(0.42)	1.04(0.84 - 1.28)
High (>2nd tertile)	341/163.13(2.09)	1.05(0.84 - 1.30)	332/463.69(0.72)	1.05(0.84 - 1.30)

**PC3_more related to “attending
other group activity/adult education
classes”**

Low (<1st tertile)	234/154.68(1.51)	Ref	233/435.15(0.54)	Ref
Moderate (1st-2nd tertile)	180/166.05(1.08)	0.82(0.69 - 0.99)	176/461.75(0.38)	0.82(0.69 - 0.99)
High (>2nd tertile)	214/162.88(1.31)	0.95(0.80 - 1.12)	227/456.16(0.5)	0.95(0.80 - 1.12)

**PC4_more related to “friend/family
visit”**

Low (<1st tertile)	228/152.93(1.49)	Ref	232/431.05(0.54)	Ref
Moderate (1st-2nd tertile)	195/162.32(1.2)	0.84(0.71 - 1.00)	216/457.08(0.47)	0.84(0.71 - 1.00)
High (>2nd tertile)	205/168.36(1.22)	0.85(0.71 - 1.00)	188/464.93(0.4)	0.85(0.71 - 1.00)

CI, confidence interval; HR, hazard ratio; Ref, reference.

*HRs (95%CIs) were derived from Cox regression models, adjusted for age, sex, ethnicity, Townsend deprivation index, education, income, body mass index, smoking status, alcohol status, Charlson comorbidity index, history of hypertension, history of hyperlipidemia.

eTable 9 Association between physical and mental pattern and subtypes of dementia, by allowing a change of the initial ‘other dementia’ diagnosis to another subtype of dementia during follow-up

Principal components	Vascular dementia		Alzheimer's disease		Other dementia	
	No. of cases/No. of Accumulated 1000*Person-Years (Incidence Rate)	HR (95%CI) *	No. of cases/No. of Accumulated 1000*Person-Years (Incidence Rate)	HR (95%CI) *	No. of cases/No. of Accumulated 1000*Person-Years (Incidence Rate)	HR (95%CI) *
Physical activity						
PC1_more related to “vigorous and other exercise at leisure time”						
Low (<1st tertile)	432/1302.68(0.33)	Ref	802/1302.68(0.62)	Ref	779/1302.68(0.6)	Ref
Moderate (1st-2nd tertile)	207/1313.4(0.16)	0.80(0.68 - 0.95)	426/1313.4(0.32)	0.80(0.71 - 0.90)	370/1313.4(0.28)	0.68(0.60 - 0.78)
High (>2nd tertile)	105/1333.82(0.08)	0.66(0.53 - 0.82)	248/1333.82(0.19)	0.71(0.62 - 0.83)	229/1333.82(0.17)	0.59(0.50 - 0.69)
PC2_more related to “housework-related activity”						
Low (<1st tertile)	282/1320.6(0.21)	Ref	550/1320.6(0.42)	Ref	469/1320.6(0.36)	Ref
Moderate (1st-2nd tertile)	248/1309.45(0.19)	0.92(0.78 - 1.10)	461/1309.45(0.35)	0.84(0.74 - 0.95)	484/1309.45(0.37)	1.03(0.91 - 1.17)
High (>2nd tertile)	214/1319.86(0.16)	0.76(0.63 - 0.92)	465/1319.86(0.35)	0.79(0.69 - 0.89)	425/1319.86(0.32)	0.83(0.73 - 0.96)
PC3_more related to “transport-related activity”						
Low (<1st tertile)	143/1326.03(0.11)	Ref	249/1326.03(0.19)	Ref	264/1326.03(0.2)	Ref
Moderate (1st-2nd tertile)	282/1321(0.21)	1.03(0.83 - 1.26)	534/1321(0.4)	1.08(0.93 - 1.27)	489/1321(0.37)	1.12(0.96 - 1.31)
High (>2nd tertile)	319/1302.87(0.24)	0.96(0.78 - 1.18)	693/1302.87(0.53)	1.10(0.95 - 1.29)	625/1302.87(0.48)	1.15(0.98 - 1.34)
PC4_more related to “job- related activity”						
Low (<1st tertile)	318/1310.68(0.24)	Ref	557/1310.68(0.42)	Ref	525/1310.68(0.4)	Ref
Moderate (1st-2nd tertile)	280/1312.94(0.21)	0.96(0.82 - 1.13)	589/1312.94(0.45)	1.11(0.99 - 1.25)	541/1312.94(0.41)	1.06(0.94 - 1.19)
High (>2nd tertile)	146/1326.28(0.11)	0.85(0.69 - 1.04)	330/1326.28(0.25)	1.07(0.93 - 1.23)	312/1326.28(0.24)	0.92(0.79 - 1.06)

PC5_more related to “walking for pleasure”

Low (<1st tertile)	269/1312.24(0.2)	Ref	448/1312.24(0.34)	Ref	487/1312.24(0.37)	Ref
Moderate (1st-2nd tertile)	237/1305.8(0.18)	0.88(0.74 - 1.05)	528/1305.8(0.4)	1.09(0.96 - 1.24)	481/1305.8(0.37)	0.95(0.83 - 1.07)
High (>2nd tertile)	238/1331.86(0.18)	1.07(0.90 - 1.28)	500/1331.86(0.38)	1.23(1.08 - 1.40)	410/1331.86(0.31)	0.95(0.83 - 1.08)

Mental activity

PC1_more related to “pub or social club visit”

Low (<1st tertile)	61/750.35(0.08)	Ref	215/750.35(0.29)	Ref	211/750.35(0.28)	Ref
Moderate (1st-2nd tertile)	103/709.04(0.15)	1.77(1.27 - 2.46)	192/709.04(0.27)	0.99(0.81 - 1.22)	174/709.04(0.25)	0.87(0.70 - 1.07)
High (>2nd tertile)	118/784.19(0.15)	1.73(1.21 - 2.47)	209/784.19(0.27)	1.07(0.86 - 1.33)	207/784.19(0.26)	0.92(0.74 - 1.15)

PC2_more related to “watching TV”

Low (<1st tertile)	46/747.25(0.06)	Ref	101/747.25(0.14)	Ref	110/747.25(0.15)	Ref
Moderate (1st-2nd tertile)	86/754.07(0.11)	1.05(0.72 - 1.51)	181/754.07(0.24)	1.02(0.80 - 1.31)	186/754.07(0.25)	1.06(0.83 - 1.35)
High (>2nd tertile)	150/742.27(0.2)	1.00(0.69 - 1.45)	334/742.27(0.45)	1.10(0.85 - 1.42)	296/742.27(0.4)	1.06(0.82 - 1.36)

PC3_more related to “attending other group activity/adult education classes”

Low (<1st tertile)	101/747.45(0.14)	Ref	254/747.45(0.34)	Ref	237/747.45(0.32)	Ref
Moderate (1st-2nd tertile)	83/750.19(0.11)	1.05(0.78 - 1.41)	165/750.19(0.22)	0.87(0.71 - 1.06)	146/750.19(0.19)	0.79(0.64 - 0.98)
High (>2nd tertile)	98/745.95(0.13)	1.10(0.82 - 1.46)	197/745.95(0.26)	0.85(0.70 - 1.03)	209/745.95(0.28)	0.99(0.82 - 1.20)

PC4_more related to “friend/family visit”

Low (<1st tertile)	121/746.65(0.16)	Ref	222/746.65(0.3)	Ref	233/746.65(0.31)	Ref
Moderate (1st-2nd tertile)	79/748.28(0.11)	0.71(0.53 - 0.94)	209/748.28(0.28)	0.99(0.82 - 1.19)	184/748.28(0.25)	0.85(0.70 - 1.04)
High (>2nd tertile)	82/748.65(0.11)	0.79(0.59 - 1.05)	185/748.65(0.25)	0.90(0.74 - 1.09)	175/748.65(0.23)	0.83(0.68 - 1.02)

CI, confidence interval; HR, hazard ratio; Ref, reference.

*HRs (95%CI) were derived from Cox regression models, adjusted for age, sex, ethnicity, Townsend deprivation index, education, income, body mass index, smoking status, alcohol status, Charlson comorbidity index, history of hypertension, history of hyperlipidemia, and family history of dement

eTable 10 Distribution of baseline reaction time

	Dementia-free	Dementia	Vascular dementia	Alzheimer's disease	Other dementia
Reaction time(milliseconds), mean (SD)*	558.95(117.33)	626.25(156.03)	637.85(159.78)	621.57(154.98)	626.19(156.24)
Reaction time (%)					
Low cognitive performance (>2 nd tertile)	161373(32.5)	2714(52.3)	456(56.8)	789(50.5)	1402(52.0)
Moderate cognitive performance (1 st -2 nd tertile)	168201(33.9)	1499(28.9)	210(26.2)	472(30.2)	791(29.3)
High cognitive performance (< 1 st tertile)	161862(32.6)	802(15.5)	111(13.8)	251(16.1)	417(15.5)
Unknown	4755(1.0)	170(3.3)	26(3.2)	49(3.1)	87(3.2)

*The score was the mean time in milliseconds across trials.

eTable 11 Associations between physical and mental activity patterns and dementia, stratified by or additionally adjusted for cognitive performance level at baseline

Principal components	Stratified by cognitive performance level at baseline				Additionally adjusted for cognitive performance level at baseline	
	Low (reaction time >2nd tertile)		High (reaction time< 1st tertile)		As a continuous variable	As a category variable
	No. of cases/No. of Accumulated 1000*Person-Years (Incidence Rate)	HR (95%CI)*	No. of cases/No. of Accumulated 1000*Person-Years (Incidence Rate)	HR (95%CI)*		
Physical activity						
PC1_more related to “vigorous and other exercise at leisure time”						
Low (<1st tertile)	1153/500.18(2.31)	Ref	274/343.71(0.8)	Ref	Ref	Ref
Moderate (1st-2nd tertile)	490/414.29(1.18)	0.70(0.63 - 0.78)	185/431.62(0.43)	0.70(0.63 - 0.78)	0.76(0.71 - 0.83)	0.76(0.7 - 0.82)
High (>2nd tertile)	263/327.09(0.8)	0.63(0.55 - 0.72)	128/554.03(0.23)	0.63(0.55 - 0.72)	0.67(0.61 - 0.74)	0.66(0.6 - 0.73)
PC2_more related to “housework-related activity”						
Low (<1st tertile)	763/439.27(1.74)		195/424.87(0.46)	Ref	Ref	Ref
Moderate (1st-2nd tertile)	594/409.21(1.45)	0.84(0.75 - 0.94)	213/443.11(0.48)	0.84(0.75 - 0.94)	0.93(0.86 - 1.01)	0.93(0.86 - 1)
High (>2nd tertile)	549/393.09(1.4)	0.77(0.69 - 0.86)	179/461.39(0.39)	0.77(0.69 - 0.86)	0.81(0.74 - 0.88)	0.8(0.74 - 0.87)
PC3_more related to “transport-related activity”						
Low (<1st tertile)	297/350.54(0.85)		146/512.4(0.28)	Ref	Ref	Ref
Moderate (1st-2nd tertile)	702/420.42(1.67)	1.17(1.02 - 1.35)	202/440.06(0.46)	1.17(1.02 - 1.35)	1.09(0.99 - 1.20)	1.10(1.00 - 1.21)
High (>2nd tertile)	907/470.6(1.93)	1.17(1.02 - 1.34)	239/376.9(0.63)	1.17(1.02 - 1.34)	1.07(0.98 - 1.18)	1.09(0.99 - 1.19)
PC4_more related to “job-related activity”						
Low (<1st tertile)	725/419.58(1.73)		241/428.04(0.56)	Ref	Ref	Ref
Moderate (1st-2nd tertile)	760/429.89(1.77)	1.06(0.96 - 1.17)	220/424.29(0.52)	1.06(0.96 - 1.17)	1.05(0.97 - 1.13)	1.05(0.97 - 1.13)

High (>2nd tertile)	421/392.1(1.07)	0.95(0.84 - 1.08)	126/477.04(0.26)	0.95(0.84 - 1.08)	0.96(0.87 - 1.05)	0.95(0.87 - 1.04)
PC5_more related to “walking for pleasure”						
Low (<1st tertile)	639/415.25(1.54)		201/439.26(0.46)	Ref	Ref	Ref
Moderate (1st-2nd tertile)	656/430.32(1.52)	0.97(0.87 - 1.08)	208/419.93(0.5)	0.97(0.87 - 1.08)	0.99(0.91 - 1.07)	1.00(0.92 - 1.08)
High (>2nd tertile)	611/395.99(1.54)	1.12(1.00 - 1.25)	178/470.17(0.38)	1.12(1.00 - 1.25)	1.08(1.00 - 1.17)	1.08(0.99 - 1.17)
Mental activity						
PC1_more related to “pub or social club visit”						
Low (<1st tertile)	245/233.18(1.05)	Ref	76/251.22(0.3)	Ref	Ref	Ref
Moderate (1st-2nd tertile)	227/203.34(1.12)	1.08(0.89 - 1.31)	90/258.25(0.35)	1.23(0.9 - 1.7-)	1.06(0.93 - 1.21)	1.06(0.93 - 1.20)
High (>2nd tertile)	254/212.17(1.2)	1.19(0.97 - 1.46)	112/304.54(0.37)	1.34(0.96 - 1.87)	1.10(0.96 - 1.27)	1.09(0.95 - 1.25)
PC2_more related to “watching TV”						
Low (<1st tertile)	115/179.1(0.64)	Ref	71/316.86(0.22)	Ref	Ref	Ref
Moderate (1st-2nd tertile)	222/213.06(1.04)	1.09(0.86 - 1.37)	76/277.45(0.27)	0.69(0.49 - 0.96)	0.99(0.85 - 1.15)	1.00(0.86 - 1.17)
High (>2nd tertile)	389/256.53(1.52)	1.08(0.86 - 1.37)	131/219.71(0.6)	0.77(0.55 - 1.08)	1.06(0.90 - 1.23)	1.06(0.90 - 1.23)
PC3_more related to “attending other group activity/adult education classes”						
Low (<1st tertile)	298/240.64(1.24)	Ref	93/246.91(0.38)	Ref	Ref	Ref
Moderate (1st-2nd tertile)	178/198.85(0.9)	0.86(0.72 - 1.04)	97/292.67(0.33)	1.16(0.87 - 1.54)	0.89(0.79 - 1.02)	0.90(0.79 - 1.02)
High (>2nd tertile)	250/209.2(1.2)	1.02(0.86 - 1.22)	88/274.44(0.32)	0.92(0.68 - 1.23)	0.97(0.86 - 1.09)	0.97(0.86 - 1.1)
PC4_more related to “friend/family visit”						
Low (<1st tertile)	288/219.93(1.31)	Ref	109/266.43(0.41)	Ref	Ref	Ref
Moderate (1st-2nd tertile)	236/214.15(1.1)	0.88(0.74 - 1.04)	87/274.19(0.32)	0.81(0.61 - 1.08)	0.87(0.77 - 0.98)	0.87(0.77 - 0.98)
High (>2nd tertile)	202/214.61(0.94)	0.79(0.66 - 0.95)	82/273.39(0.3)	0.78(0.59 - 1.04)	0.84(0.75 - 0.95)	0.85(0.75 - 0.96)

CI, confidence interval; HR, hazard ratio; Ref, reference.

*HRs (95%CI) were derived from Cox regression models, adjusted for age, sex, ethnicity, Townsend deprivation index, education, income, body mass index, smoking status, alcohol status, Charlson comorbidity index, history of hypertension, history of hyperlipidemia, and family history of dementia.

eTable 12 Associations between physical and mental activity patterns and dementia where the estimates for principal components (PCs) in one domain were measured by additionally adjusted all meaningful PCs in the other domain

Principal components	No. of cases/No. of Accumulated 1000*Person-Years (Incidence Rate)	HR (95%CI)*
Physical activity		
PC1_more related to “vigorous and other exercise at leisure time”		
Low (<1st tertile)	533/457.93(1.16)	Ref
Moderate (1st-2nd tertile)	427/639.23(0.67)	0.84(0.73 - 0.95)
High (>2nd tertile)	295/836.73(0.35)	0.69(0.59 - 0.80)
PC2_more related to “housework-related activity”		
Low (<1st tertile)	423/658.81(0.64)	Ref
Moderate (1st-2nd tertile)	439/647.04(0.68)	0.93(0.81 - 1.07)
High (>2nd tertile)	393/628.04(0.63)	0.76(0.66 - 0.88)
PC3_more related to “transport-related activity”		
Low (<1st tertile)	239/632.6(0.38)	Ref
Moderate (1st-2nd tertile)	426/659.36(0.65)	0.97(0.83 - 1.14)
High (>2nd tertile)	590/641.92(0.92)	1.01(0.86 - 1.19)
PC4_more related to “job-related activity”		
Low (<1st tertile)	520/682.98(0.76)	Ref
Moderate (1st-2nd tertile)	485/632.14(0.77)	1.03(0.91 - 1.17)
High (>2nd tertile)	250/618.76(0.4)	0.93(0.79 - 1.08)
PC5_more related to “walking for pleasure”		
Low (<1st tertile)	400/620.03(0.65)	Ref
Moderate (1st-2nd tertile)	442/648.57(0.68)	0.97(0.85 - 1.12)
High (>2nd tertile)	413/665.29(0.62)	1.10(0.96 - 1.27)
Mental activity		
Low (<1st tertile)	420/646.59(0.65)	Ref
Moderate (1st-2nd tertile)	390/614.48(0.63)	1.00(0.86 - 1.15)
High (>2nd tertile)	445/672.82(0.66)	1.02(0.87 - 1.19)
PC2_more related to “watching TV”		
Low (<1st tertile)	218/651.23(0.33)	Ref
Moderate (1st-2nd tertile)	380/654.37(0.58)	1.05(0.88 - 1.24)
High (>2nd tertile)	657/628.28(1.05)	1.12(0.94 - 1.33)
PC3_more related to “attending other group activity/adult education classes”		
Low (<1st tertile)	479/634.04(0.76)	Ref
Moderate (1st-2nd tertile)	345/656.99(0.53)	0.92(0.80 - 1.06)
High (>2nd tertile)	431/642.86(0.67)	1.01(0.88 - 1.15)
PC4_more related to “friend/family visit”		
Low (<1st tertile)	478/634.58(0.75)	Ref

Moderate (1st-2nd tertile)	401/652.5(0.61)	0.89(0.78 - 1.02)
High (>2nd tertile)	376/646.81(0.58)	0.89(0.77 - 1.02)

***For physical activity patterns**, HRs (95%CI) were derived from Cox regression models, adjusted for age, sex, ethnicity, Townsend deprivation index, education, income, body mass index, smoking status, alcohol status, Charlson comorbidity index, history of hypertension, history of hyperlipidemia, family history of dementia, and **PC4_more related to “friend/family visit”**.

***For mental activity patterns**, HRs (95%CI) were derived from Cox regression models, adjusted for age, sex, ethnicity, Townsend deprivation index, education, income, body mass index, smoking status, alcohol status, Charlson comorbidity index, history of hypertension, history of hyperlipidemia, family history of dementia, **PC1_more related to “vigorous and other exercise at leisure time”**, and **PC2_more related to “housework-related activity”**.

eTable 13 Associations between physical and mental activity patterns and dementia, with the application of a 5- or

10-years lag time

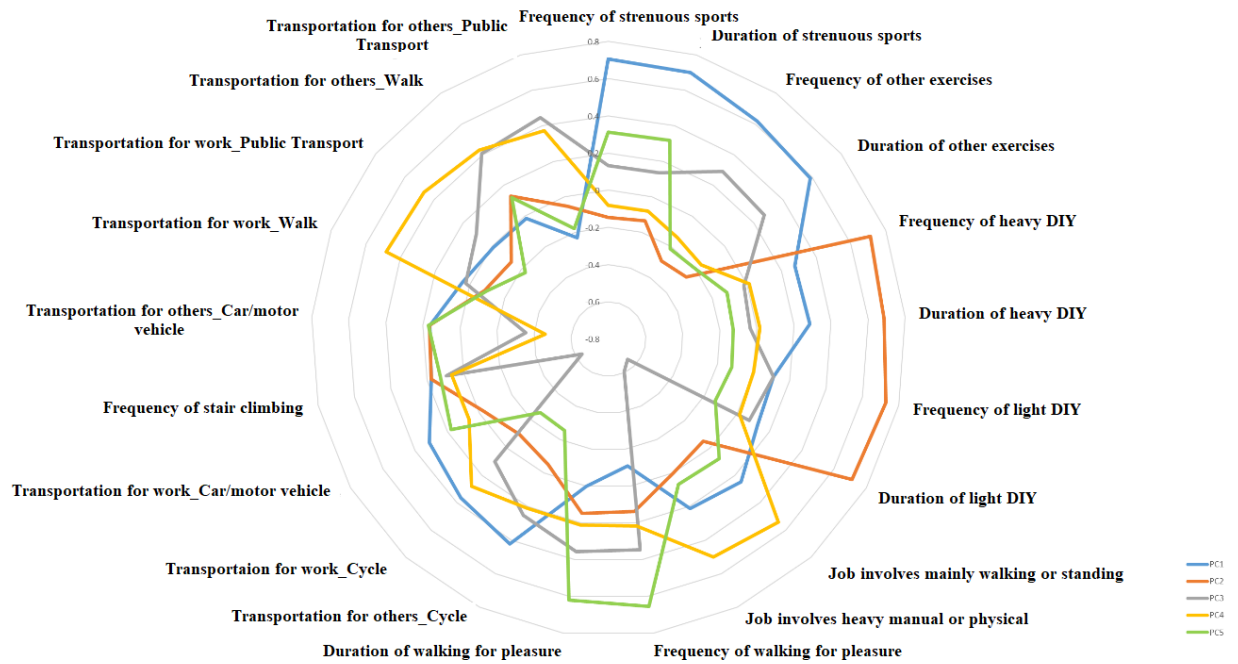
Principal components	Application of a 5- year lag time		Application of a 10- year lag time	
	No. of cases/No. of Accumulated 1000*Person-Years (Incidence Rate)	HR (95%CI)*	No. of cases/No. of Accumulated 1000*Person-Years (Incidence Rate)	HR (95%CI)*
Physical activity				
PC1_more related to “vigorous and other exercise at leisure time”				
Low (<1st tertile)	1772/763.17(2.32)	Ref	434/119.19(3.64)	Ref
Moderate (1st-2nd tertile)	899/776.04(1.16)	0.76(0.7 - 0.83)	257/125.16(2.05)	0.87(0.75 - 1.02)
High (>2nd tertile)	525/792(0.66)	0.66(0.6 - 0.73)	146/130.78(1.12)	0.76(0.62 - 0.92)
PC2_more related to “housework-related activity”				
Low (<1st tertile)	1144/780.03(1.47)	Ref	303/126.56(2.39)	Ref
Moderate (1st-2nd tertile)	1069/773.26(1.38)	0.94(0.87 - 1.03)	266/125.2(2.12)	0.90(0.76 - 1.07)
High (>2nd tertile)	983/777.92(1.26)	0.81(0.74 - 0.88)	268/123.37(2.17)	0.87(0.73 - 1.03)
PC3_more related to “transport-related activity”				
Low (<1st tertile)	582/787.65(0.74)	Ref	154/132.36(1.16)	Ref
Moderate (1st-2nd tertile)	1185/779.36(1.52)	1.12(1.01 - 1.24)	317/125.88(2.52)	1.12(0.92 - 1.37)
High (>2nd tertile)	1429/764.2(1.87)	1.08(0.98 - 1.20)	366/116.88(3.13)	1.09(0.90 - 1.33)
PC4_more related to “job-related activity”				
Low (<1st tertile)	1250/773.62(1.62)	Ref	348/126.48(2.75)	Ref
Moderate (1st-2nd tertile)	1224/774.02(1.58)	1.03(0.95 - 1.11)	318/124.1(2.56)	1.01(0.87 - 1.18)
High (>2nd tertile)	722/783.57(0.92)	0.98(0.89 - 1.08)	171/124.55(1.37)	0.93(0.77 - 1.12)
PC5_more related to “walking for pleasure”				
Low (<1st tertile)	1073/772.86(1.39)	Ref	280/123.08(2.28)	Ref
Moderate (1st-2nd tertile)	1113/770.05(1.45)	0.99(0.91 - 1.08)	305/123.11(2.48)	1.04(0.89 - 1.23)
High (>2nd tertile)	1010/788.29(1.28)	1.06(0.97 - 1.16)	252/128.94(1.95)	1.01(0.85 - 1.20)
Mental activity				
PC1_more related to “pub or social club visit”				
Low (<1st tertile)	439/443.55(0.99)	Ref	110/70.83(1.55)	Ref
Moderate (1st-2nd tertile)	428/418.56(1.02)	1.06(0.92 - 1.22)	122/65.81(1.85)	1.26(0.96 - 1.66)
High (>2nd tertile)	475/462.58(1.03)	1.10(0.95 - 1.28)	116/73.22(1.58)	1.18(0.87 - 1.59)
PC2_more related to “watching TV”				
Low (<1st tertile)	242/441.76(0.55)	Ref	61/69.42(0.88)	Ref

Moderate (1st-2nd tertile)	388/445.56(0.87)	0.96(0.81 - 1.13)	101/70.94(1.42)	0.93(0.67 - 1.30)
High (>2nd tertile)	712/437.37(1.63)	1.05(0.89 - 1.24)	186/69.5(2.68)	0.96(0.69 - 1.33)
PC3_more related to “attending other group activity/adult education classes”				
Low (<1st tertile)	521/441.66(1.18)	Ref	118/70.56(1.67)	Ref
Moderate (1st-2nd tertile)	369/443.08(0.83)	0.92(0.81 - 1.06)	97/70.22(1.38)	1.15(0.87 - 1.51)
High (>2nd tertile)	452/439.96(1.03)	0.95(0.84 - 1.09)	133/69.08(1.93)	1.30(1.01 - 1.68)
PC4_more related to “friend/family visit”				
Low (<1st tertile)	508/440.35(1.15)	Ref	125/69.73(1.79)	Ref
Moderate (1st-2nd tertile)	428/442.21(0.97)	0.90(0.79 - 1.02)	111/70.39(1.58)	0.96(0.74 - 1.24)
High (>2nd tertile)	406/442.14(0.92)	0.87(0.76 - 1.00)	112/69.75(1.61)	1.00(0.77 - 1.29)

CI, confidence interval; HR, hazard ratio; Ref, reference.

*HRs (95%CIs) were derived from Cox regression models, adjusted for age, sex, ethnicity, Townsend deprivation index, education, income, body mass index, smoking status, alcohol status, Charlson comorbidity index, history of hypertension, history of hyperlipidemia, and family history of dementia.

(A)



(B)

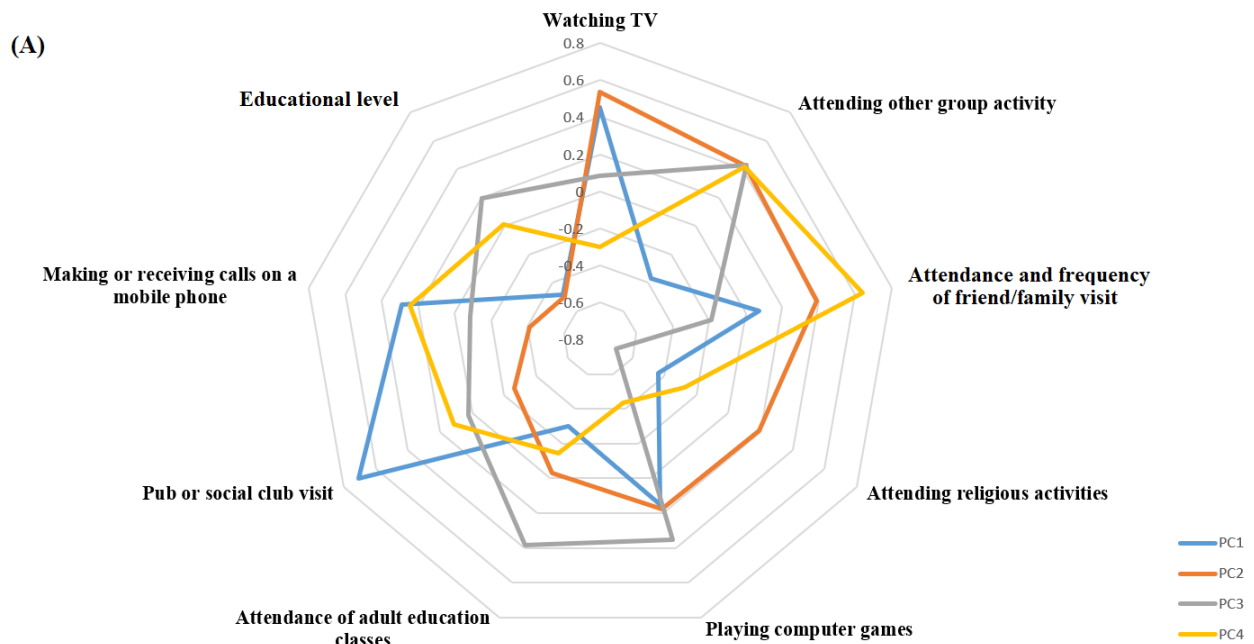
Principal Components	Positive Scoring Coefficients	Negative Scoring Coefficients	Variance Explained
PC1_more related to “vigorous and other exercise at leisure time”	Frequency of strenuous sports (0.71) Duration of strenuous sports (0.70) Frequency of other exercises (0.62)		12.1
PC1_2 more related to “housework-related activity”	Frequency of light DIY (0.73) Frequency of heavy DIY (0.71) Duration of light DIY (0.71) Duration of heavy DIY (0.69)		11.3
PC3_more related to “transport-related activity”	Transportation for excluding work_ Public Transport (0.45) Transportation for excluding work_ Walk (0.41)	Job involves heavy manual or physical (-0.61) Transportation for work_ Car/motor vehicle (-0.64) Job involves mainly walking or standing (-0.65)	11.0
PC4_more related to “job-related activity”	Job involves mainly walking or standing (0.54) Job involves heavy manual or physical (0.50)	Transportation for excluding work_ Car/motor vehicle (-0.46)	8.7
PC5_more related to “walking for pleasure”	Frequency of walking for pleasure (0.65) Duration of walking for pleasure (0.62)		7.1
Total (PC1-PC5)			50.2

Extraction method: Principal Component Analysis. Rotation method: none

eFigure 1 Identification of physical activity patterns

(A) The radar of loading values of 21 physical activity-related items, for the top principal components (PCs) identified by principal component analysis (PCA)

(B) Summary of the distinct physical activity patterns, based on the significant PCs identified by PCA



(B)

Principal Components	Positive Scoring Coefficients	Negative Scoring Coefficients	Variance Explained
PC1_more related to "pub or social club visit"	Visiting pub or social club (0.71) Watching TV (0.45)	Attending other group activity (-0.37) Attending religious activities (-0.43) Education level (-0.48)	16.42
PC2_more related to "watching TV"	Watching TV (0.53) Attending other group activity (0.42)	Making or receiving calls on a mobile phone (-0.41) Education level (-0.50)	13.05
PC3_more related to "attending other group activity/adult education classes"	Attending other group activity (0.43) Attending adult education classes (0.39)	Attending religious activities (-0.70)	11.53
PC4_More related to "friend/family visit"	Friends visit (0.64) Attending other group activity (0.41)	Watching TV (-0.30) Playing computer games (-0.43)	11.50
Total (PC1-PC4)			52.5

Extraction method: Principal Component Analysis. Rotation method: none

eFigure 2 Identification of mental activity patterns

(A) The radar of loading values of 9 mental activity-related items, for the top four principal components (PCs) identified by principal component analysis (PCA)

(B) Summary of the distinct mental activity patterns, based on the significant PCs identified by PCA

Study protocol

Physical and mental activity, disease susceptibility, and risk of dementia: a prospective cohort study based on UK Biobank

Aim: To examine the association between patterns of physical and mental activity and dementia, and whether it can be modified by disease susceptibility to dementia.

Design: Population-based cohort.

Methods:

- Study cohort: Participants recruited in the UK Biobank during 2006-2010.
 - **Exclusion criteria:** Withdrew from UK Biobank, diagnosed with dementia before recruitment or no available information about exposed variables (mental and physical activity items).
 - **Follow-up:** the follow-up for each participant will be started from one year after the recruitment date (i.e., 1-year lag-time) until a diagnosis of dementia, death, or the end of study (i.e., 31 December 2019), whichever occurred first.
- Exposed variables: Information of physical or mental activity at baseline, collected through questionnaire.
 - Physical activity was assessed by 21 items from the well-validated short self-reported International Physical Activity Questionnaire (IPAQ)21 at recruitment. There are five major categories, including physical activity at leisure time, housework-related activity, job-related activity, transportation for work and transportation for others. For specific physical activity within the first two categories, participants reported their attendance (yes or no), frequency (days/week) and duration (minutes/day).
 - Mental activity was assessed by three major categories, including intelligence (i.e., educational level and attendance of adult education classes), social contact (i.e., attendance and frequency of friend/family visit, pub or social club visit, religious and other group activity), and use of electronic device (i.e., frequency of playing computer games, watching TV, and making or receiving calls on a mobile phone) .
- Outcome
 - Cases of dementia will be identified based on the UK Biobank inpatient data, according to ICD-10 codes in Table 1. We will also do separate analyses for subtypes of dementia, including vascular dementia, Alzheimer's disease and other dementia.

Table 1 Diagnosis codes used for dementia identification

International Classification of Diseases-10 (ICD-10)		
Dementia	Vascular dementia	F01.0, F01.1, F01.2, F01.3, F01.8, F01.9, I67.3
	Alzheimer disease	F00.0, F00.1, F00.2, F00.9, G30.0, G30.1, G30.8, G30.9
	Frontotemporal dementia	F02.0, G31.0
	Other dementia	A81.0, F02.1, F02.2, F02.3, F02.4, F02.8, F03, F05.1, F10.6, G31.1, G31.8

- Disease susceptibility

- The disease susceptibility to dementia for each participant will be assessed by polygenetic risk score (PRS) and family history of dementia (based on self-reported data at baseline).

- Covariates:

- Sex, age, ethnicity, income, alcohol drinking, smoking status, body mass index, Townsend deprivation index, Charlson comorbidity index.

- Data analyses:

- First, we plan to identify patterns of physical and mental activity using principal component analysis (PCA).
- Second, we will test the association between individual items of physical and mental activity, as well as patterns of physical and mental activity, and dementia using Cox regression models, representing as hazard ratios (HRs) and their 95% confidence interval.
- Third, to explore whether the associations between patterns of physical and mental activity and dementia can be modified by disease susceptibility, we will perform stratified analyses by PRS for dementia (high: >2nd tertile or low: <1st tertile) and family history of dementia (with or without).

Timeline:

Protocol ready by June 2020; analyses ready by April 2021; draft ready by July 2021.