

Supplementary Material 1

The questionnaire regarding physical activity in Korean nationwide health screening (translated into English).

Please read the following questions and select your current situation.

During the last 7 days, how many days did you do vigorous activities like heavy lifting, digging, aerobics, or fast bicycling?

☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7

During the last 7 days, how many days did you perform moderate physical activities such as carrying light loads, bicycling at a regular place, or double tennis?

※ Do not include walking.

☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7

During the last 7 days, on how many days did you walk for at least 30 minutes at a time?

This includes walking at work and at home, walking to travel from place to place, and any other walking that you did solely for recreation, sport, exercise, or leisure.

☐ 0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7

Supplementary Table S1 Hazard ratios and 95% CIs for the incidence of dementia according to changes in regular physical activity* (sensitivity analysis)

Change in regular physical activity	N	Event	Person-years (PYs)	Incidence rate (per 1000 PYs)	HR (95% CI)		
					Model 1 [†]	Model 2 [‡]	Model 3 [§]
All-cause dementia							
Continuous lack of PA	92,124	2,431	441,316	5.51	1 (reference)	1 (reference)	1 (reference)
Decreaser	19,561	352	94,479	3.73	0.86 (0.77–0.96)	0.87 (0.78–0.97)	0.87 (0.78–0.98)
Increaser	13,180	320	63,767	5.02	0.90 (0.80–1.01)	0.90 (0.80–1.02)	0.91 (0.81–1.02)
Continuous PA	8,886	137	42,717	3.21	0.74 (0.62–0.87)	0.76 (0.64–0.91)	0.77 (0.65–0.91)
Alzheimer's disease							
Continuous lack of PA	92,124	1,811	441,316	4.10	1 (reference)	1 (reference)	1 (reference)
Decreaser	19,561	273	94,479	2.89	0.92 (0.81–1.05)	0.92 (0.81–1.05)	0.93 (0.82–1.05)
Increaser	13,180	237	63,767	3.72	0.91 (0.79–1.04)	0.91 (0.79–1.04)	0.91 (0.80–1.05)
Continuous PA	8,886	99	42,717	2.32	0.74 (0.60–0.91)	0.76 (0.62–0.94)	0.77 (0.63–0.94)
Vascular dementia							
Continuous lack of PA	92,124	351	441,316	0.80	1 (reference)	1 (reference)	1 (reference)

Decreaser	19,561	47	94,479	0.50	0.74 (0.54–1.00)	0.76 (0.56–1.03)	0.76 (0.56–1.03)
Increaser	13,180	52	63,767	0.82	0.97 (0.73–1.30)	0.99 (0.74–1.32)	0.99 (0.74–1.32)
Continuous PA	8,886	19	42,717	0.44	0.63 (0.40–1.01)	0.68 (0.43–1.08)	0.69 (0.43–1.09)

HR, hazard ratio; PA, physical activity.

*Regular physical activity was defined as $\geq 1,000$ metabolic equivalent task minutes per week.

[†]Model 1 was adjusted for age and sex.

[‡]Model 2 was adjusted for age, sex, smoking status, alcohol consumption, income level, body mass index, and comorbidities (hypertension, dyslipidemia, chronic kidney disease, cancer, and depression).

[§]Model 3 was adjusted for age, sex, smoking status, alcohol consumption, income level, body mass index, comorbidities (hypertension, dyslipidemia, chronic kidney disease, cancer, and depression), and antidiabetic drugs.

Supplementary Table S2 Hazard ratios and 95% CIs for the incidence of dementia according to regular physical activity change over a 4-year interval

Change in regular physical activity	N	Event	Person-years (PYs)	Incidence rate (per 1000 PYs)	HR (95% CI)		
					Model 1 [†]	Model 2 [‡]	Model 3 [§]
All-cause dementia							
Continuous lack of PA	55,836	806	138,440	5.82	1 (reference)	1 (reference)	1 (reference)
Decreaser	10,077	153	25,354	6.03	1.01 (0.85–1.20)	1.02 (0.86–1.21)	1.02 (0.86–1.22)
Increaser	14,879	119	37,526	3.17	0.70 (0.58–0.85)	0.71 (0.58–0.86)	0.71 (0.58–0.86)
Continuous PA	7,533	66	19,058	3.46	0.73 (0.56–0.94)	0.74 (0.57–0.95)	0.74 (0.57–0.95)
Alzheimer's disease							
Continuous lack of PA	55,836	646	138,440	4.67	1 (reference)	1 (reference)	1 (reference)
Decreaser	10,077	115	25,354	4.54	0.96 (0.79–1.17)	0.97 (0.79–1.18)	0.97 (0.79–1.18)
Increaser	14,879	90	37,526	2.40	0.67 (0.54–0.84)	0.68 (0.54–0.85)	0.68 (0.54–0.85)
Continuous PA	7,533	51	19,058	2.68	0.72 (0.54–0.96)	0.73 (0.55–0.97)	0.73 (0.55–0.97)
Vascular dementia							
Continuous lack of PA	55,836	102	138,440	0.74	1 (reference)	1 (reference)	1 (reference)

Decreaser	10,077	19	25,354	0.75	0.94 (0.58–1.54)	0.96 (0.59–1.56)	0.96 (0.59–1.57)
Increaser	14,879	19	37,526	0.51	0.80 (0.49–1.32)	0.82 (0.50–1.34)	0.82 (0.50–1.35)
Continuous PA	7,533	11	19,058	0.58	0.84 (0.45–1.58)	0.87 (0.47–1.64)	0.88 (0.47–1.65)

HR, hazard ratio; PA, physical activity.

*Model 1 was adjusted for age and sex.

†Model 2 was adjusted for age, sex, smoking status, alcohol consumption, income level, body mass index, and comorbidities (hypertension, dyslipidemia, chronic kidney disease, cancer, and depression).

‡Model 3 was adjusted for age, sex, smoking status, alcohol consumption, income level, body mass index, comorbidities (hypertension, dyslipidemia, chronic kidney disease, cancer, and depression), and antidiabetic drugs.

Supplementary Table S3 Hazard ratios and 95% CIs for the incidence of dementia according to changes in regular physical activity after adjusting for confounders both at initial and follow-up assessment

Change in regular physical activity	N	Event	Person-years (PYs)	Incidence rate (per 1000 PYs)	HR (95% CI)		
					Model 1 [†]	Model 2 [‡]	Model 3 [§]
All-cause dementia							
Continuous lack of PA	86,643	2322	414,451	5.60	1 (reference)	1 (reference)	1 (reference)
Decreaser	14,396	355	69,594	5.10	0.89 (0.80–1.00)	0.89 (0.80–1.00)	0.89 (0.80–1.00)
Increaser	21,159	385	102,371	3.76	0.85 (0.76–0.95)	0.86 (0.77–0.96)	0.86 (0.78–0.96)
Continuous PA	11,533	178	55,863	3.19	0.69 (0.59–0.81)	0.72 (0.61–0.84)	0.72 (0.62–0.84)
Alzheimer's disease							
Continuous lack of PA	86,643	1744	414,451	4.21	1 (reference)	1 (reference)	1 (reference)
Decreaser	14,396	252	69,594	3.62	0.86 (0.75–0.98)	0.85 (0.75–0.97)	0.85 (0.75–0.98)
Increaser	21,159	292	102,371	2.85	0.88 (0.78–1.00)	0.89 (0.79–1.01)	0.89 (0.79–1.01)
Continuous PA	11,533	132	55,863	2.36	0.71 (0.59–0.84)	0.73 (0.61–0.87)	0.73 (0.61–0.88)
Vascular dementia							
Continuous lack of PA	86,643	328	414,451	0.79	1 (reference)	1 (reference)	1 (reference)

Decreaser	14,396	59	69,594	0.85	1.01 (0.76–1.33)	1.02 (0.77–1.35)	1.02 (0.78–1.35)
Increaser	21,159	59	102,371	0.58	0.85 (0.64–1.12)	0.88 (0.66–1.16)	0.88 (0.67–1.16)
Continuous PA	11,533	23	55,863	0.41	0.57 (0.37–0.87)	0.61 (0.40–0.93)	0.62 (0.40–0.94)

HR, hazard ratio; PA, physical activity.

*Model 1 was adjusted for age and sex.

†Model 2 was adjusted for age, sex, smoking status, alcohol consumption, income level, body mass index, and comorbidities (hypertension, dyslipidemia, chronic kidney disease, cancer, and depression).

‡Model 3 was adjusted for age, sex, smoking status, alcohol consumption, income level, body mass index, comorbidities (hypertension, dyslipidemia, chronic kidney disease, cancer, and depression), and antidiabetic drugs.

Supplementary Table S4 Hazard ratios and 95% CIs for the incidence of dementia according to relative change in physical activity

Change in PA	MET minutes	N	Event	Person-years	Incidence rate	HR (95% CI)		
	per week			(PYs)	(per 1000 PYs)	Model 1 [†]	Model 2 [‡]	Model 3 [§]
All-cause dementia								
Continuous lack of PA		86,643	2,322	414,451	5.60	1 (reference)	1 (reference)	1 (reference)
Increaser	<1,000	4,514	76	21,985	3.46	0.79 (0.63–0.99)	0.80 (0.63–1.00)	0.80 (0.64–1.01)
	≥1,000	16,645	309	80,386	3.84	0.87 (0.77–0.98)	0.87 (0.77–0.98)	0.87 (0.77–0.98)
Decreaser	<500	7,585	201	36,869	5.45	0.91 (0.79–1.05)	0.91 (0.78–1.05)	0.90 (0.78–1.04)
	≥500	6,811	154	32,724	4.71	0.87 (0.74–1.03)	0.88 (0.75–1.04)	0.89 (0.76–1.05)
Continuous PA	<1,000	2,098	30	10,257	2.92	0.61 (0.43–0.88)	0.65 (0.45–0.93)	0.65 (0.45–0.93)
	≥1,000	9,455	148	45,605	3.25	0.71 (0.60–0.84)	0.73 (0.62–0.87)	0.74 (0.63–0.88)
Alzheimer's disease								
Continuous lack of PA		86,643	1,744	414,451	4.21	1 (reference)	1 (reference)	1 (reference)
Increaser	<1,000	4,514	51	21,985	2.32	0.72 (0.55–0.96)	0.73 (0.55–0.96)	0.73 (0.55–0.97)
	≥1,000	16,645	241	80,386	3.00	0.92 (0.80–1.06)	0.92 (0.80–1.06)	0.92 (0.81–1.06)
Decreaser	<500	7,585	141	36,869	3.82	0.86 (0.72–1.02)	0.85 (0.72–1.01)	0.85 (0.72–1.01)

	≥500	6,811	111	32,724	3.39	0.85 (0.70–1.03)	0.86 (0.71–1.05)	0.87 (0.72–1.05)
Continuous PA	<1,000	2,098	25	10,257	2.43	0.70 (0.47–1.04)	0.74 (0.50–1.10)	0.75 (0.50–1.11)
	≥1,000	9,455	107	45,605	2.35	0.71 (0.58–0.86)	0.73 (0.60–0.88)	0.73 (0.60–0.89)
Vascular dementia								
Continuous lack of PA		86,643	328	414,451	0.79	1 (reference)	1 (reference)	1 (reference)
Increaser	<1,000	4,514	18	21,985	0.82	1.21 (0.75–1.95)	1.24 (0.77–2.00)	1.26 (0.78–2.02)
	≥1,000	16,645	41	80,386	0.51	0.75 (0.54–1.04)	0.77 (0.56–1.07)	0.77 (0.56–1.07)
Decreaser	<500	7,585	37	36,869	1.00	1.15 (0.82–1.61)	1.15 (0.82–1.62)	1.15 (0.82–1.62)
	≥500	6,811	22	32,724	0.67	0.83 (0.54–1.29)	0.86 (0.56–1.32)	0.86 (0.56–1.33)
Continuous PA	<1,000	2,098	2	10,257	0.19	0.26 (0.07–1.05)	0.28 (0.07–1.12)	0.28 (0.07–1.12)
	≥1,000	9,455	21	45,605	0.46	0.64 (0.41–1.00)	0.69 (0.44–1.07)	0.70 (0.45–1.09)

PA, physical activity; MET, metabolic equivalent task; HR, hazard ratio.

*Model 1 was adjusted for age and sex.

†Model 2 was adjusted for age, sex, smoking status, alcohol consumption, income level, body mass index, and comorbidities (hypertension, dyslipidemia, chronic kidney disease, cancer, and depression).

‡Model 3 was adjusted for age, sex, smoking status, alcohol consumption, income level, body mass index, comorbidities (hypertension,

dyslipidemia, chronic kidney disease, cancer, and depression), and antidiabetic drugs.

Supplementary Table S5 Hazard ratios and 95% CIs for the incidence of dementia after further adjusting for relative changes in physical activity (change in the frequency of physical activity)

Change in regular physical activity	N	Event	Person-years (PYs)	Incidence rate (per 1000 PYs)	HR (95% CI)		
					Model 1 [†]	Model 2 [‡]	Model 3 [§]
All-cause dementia							
Continuous lack of PA	86,643	2,322	414,451	5.60	1 (reference)	1 (reference)	1 (reference)
Decreaser	14,396	355	69,594	5.10	0.88 (0.75–1.02)	0.88 (0.76–1.03)	0.89 (0.76–1.03)
Increaser	21,159	385	102,371	3.76	0.86 (0.74–1.00)	0.87 (0.75–1.01)	0.87 (0.75–1.01)
Continuous PA	11,553	178	55,863	3.19	0.69 (0.59–0.81)	0.72 (0.62–0.84)	0.73 (0.62–0.85)
Alzheimer's disease							
Continuous lack of PA	86,643	1,744	414,451	4.21	1 (reference)	1 (reference)	1 (reference)
Decreaser	14,396	252	69,594	3.62	0.85 (0.71–1.01)	0.85 (0.71–1.01)	0.85 (0.71–1.02)
Increaser	21,159	292	102,371	2.85	0.89 (0.75–1.06)	0.89 (0.75–1.06)	0.89 (0.75–1.06)
Continuous PA	11,553	132	55,863	2.36	0.71 (0.59–0.84)	0.73 (0.61–0.87)	0.74 (0.62–0.88)
Vascular dementia							
Continuous lack of PA	86,643	328	414,451	0.79	1 (reference)	1 (reference)	1 (reference)

Decreaser	14,396	59	69,594	0.85	0.84 (0.57–1.23)	0.85 (0.58–1.25)	0.86 (0.58–1.26)
Increaser	21,159	59	102,371	0.58	1.01 (0.70–1.47)	1.039(0.71–1.51)	1.04 (0.71–1.51)
Continuous PA	11,553	23	55,863	0.41	0.57 (0.37–0.87)	0.61 (0.40–0.93)	0.62 (0.40–0.94)

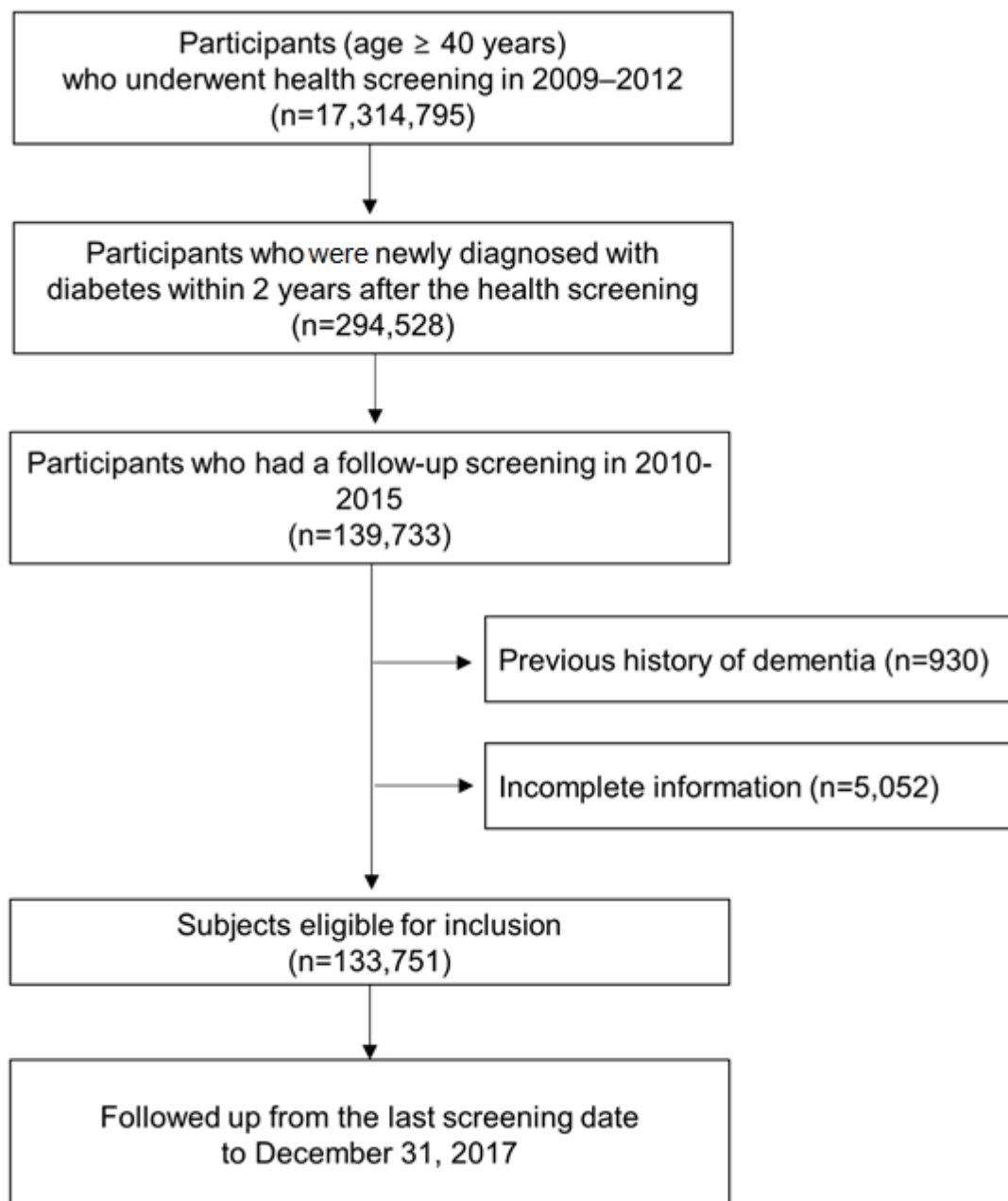
HR, hazard ratio; PA, physical activity.

*Model 1 was adjusted for age and sex.

†Model 2 was adjusted for age, sex, smoking status, alcohol consumption, income level, body mass index, and comorbidities (hypertension, dyslipidemia, chronic kidney disease, cancer, and depression).

‡Model 3 was adjusted for age, sex, smoking status, alcohol consumption, income level, body mass index, comorbidities (hypertension, dyslipidemia, chronic kidney disease, cancer, and depression), antidiabetic drugs, and changes in the frequency of physical activity.

Supplementary Figure S1 Flow chart of study population



Supplementary Figure S2 Diagram of the study timeline

