

SUPPLEMENTARY DATA

APPENDIX A

Leisure activities interview protocol

Instructions: Following are questions regarding your leisure activities. Write or check the answer that best suits you.

Have you participated in any of the following entertainment or cultural activities in the last 12 months?	
<ol style="list-style-type: none">1. Cinema/Theatre/Concert2. Sporting Events3. Museum/Art exhibit4. Go to Restaurant/Pub/Café5. Bingo6. Dancing7. Attend church/revival meeting8. Participate in study circle or a course9. Participate in volunteer work10. Participate in association/club work11. Travel12. Gardening13. Hiking in forest/picking berries, mushrooms14. Hunting, fishing15. Knitting, weaving, sewing16. Painting, drawing, working with clay/pottery17. Home repairs18. Car or mechanical repairs19. Read the newspaper/ magazine or journal/books20. Watch TV21. Play chess/card games22. Play musical instrument23. Listen to music24. Use the internet or play computer games	<p>For each item:</p> <p>Yes, to the same degree Yes, to a higher degree Yes, but to a lesser degree No No response</p>

In the last 12 months:	
<ol style="list-style-type: none">25. Did you regularly engage in light exercise (e.g. walking along roads or in parks, walking in the woods, short bicycle rides, light aerobics, golf)?26. Did you regularly engage in moderate to intense exercise, now or previously (e.g. jogging, long power walks, heavy-duty gardening, long bicycle rides, high-intensity aerobics, long distance ice skating, swimming, ball sports (not golf) or other similar activity)?	<p>Every day; Several times a week; 2-3 times/month; Less; Never; Don't know; No response; Several options checked</p> <p>Every day; Several times a week; 2-3 times/month; Less; Never; Don't know; No response; Several options checked</p>

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APPENDIX B

Social network questionnaire (Hanson et al. 1997)

Instructions: Following there are questions regarding your social network. Write or check the answers that best suit you.

Frequency of direct or remote contacts

How often do you meet the following in person?	
1. Parents 2. Children 3. Son/daughter-in-law 4. Grandchildren 5. Siblings 6. Other relative 7. Neighbour 8. Friend	For each item: Daily, more than twice/week Weekly, more than twice/month Monthly, more than 6 times/year Quarterly, more than once/year Less often Never Don't know N/A (e.g., have no children or parent no longer alive) No response Several options checked

How often are you in touch, via telephone, letters, e-mail with the following:	
9. Parents 10. Children 11. Son/daughter-in-law 12. Grandchildren 13. Siblings 14. Other relative 15. Neighbour 16. Friend	For each item: Daily, more than twice/week Weekly, more than twice/month Monthly, more than 6 times/year Quarterly, more than once/year Less often Never Don't know N/A (e.g., have no children or parent no longer alive) No response Several options checked

Satisfaction with these contacts

Are you satisfied with these contacts?	
17. Parents 18. Children 19. Son/Daughter-in-law 20. Grandchildren 21. Siblings 22. Other relative 23. Neighbour 24. Friend	For each item: Yes No Don't know N/A (e.g. do not have children or parents no longer alive) No response Several options checked

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Perceived material support

27. Could you get help from one or several people in case of illness or other practical troubles? (e.g. borrow little things, get help with repairs, get advice and information) 28. Do you know one or several people who could help you write an official letter or appeal a government decision?	For each item: Yes, without a doubt Yes, probably No, probably not No, not at all Don't know No response Several options checked
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Social network size

29. How many people do you feel you know well and can talk to about most things? (e.g. relatives, friends, neighbours, and/or colleagues)	None; 1-2 people; 3 people; 4-6 people; 7-9 people; 10-15 people; 16-30 people; More than 30 people; Don't know; No response; Several options checked
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Perceived psychological support

30. Do you feel that you know one or a few people who could give you proper personal/emotional support to manage the stress and troubles of life? 31. Do you know someone with whom you can be yourself, who accepts you for all your good and bad qualities?	For each item: Yes, without a doubt Yes, probably No, probably not No, not at all Don't know No response Several options checked
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Sense of affinity with association members

32. If you are part of an association/organization, would you say you feel a strong sense of belonging to this group and its members?	I am not member of any association; To a high degree; To a modest degree; Not especially; Not at all; Don't know; No response; Several options checked
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Sense of affinity with relatives

33. Do you feel a strong sense of kinship with your relatives (beyond spouse/partner/children)?	Have no family; To a high degree; To a modest degree; Not especially; Not at all; Don't know; No response; Several options checked
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Sense of affinity with residence area

34. Are you rooted in and feel a strong sense of kinship with your neighbourhood?	To a high degree; To a certain degree; Not especially; Not at all; Don't know; No response; Several options checked
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Being part of a group of friends

35. Are you part of a group of friends/acquaintances who have something in common or do some activity together (e.g., play cards, listen to music, go on excursions, etc.)?	Yes; No; Don't know; No response; Several options checked
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36. Are you part of a group of friends/acquaintances who have something in common or do some activity together (e.g., play cards, listen to music, go on excursions, etc.)?	Yes; No; Don't know; No response; Several options checked
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APPENDIX C “Sensitivity analysis”

Secondary analyses were performed as following:

- 1) The analyses were repeated using multiple imputation for missing values. Similar results to those from the initial analyses were shown.
- 2) To minimize potential reverse causality, we repeated the main analyses by excluding 96 participants who were diagnosed with dementia during the first three years of follow-up. The results on the association between diabetes and dementia ($HR=2.7$, 95% CI 1.6–4.6) and on the joint exposure of diabetes and an active lifestyle in relation to dementia were similar to those reported in Table 3 and Figure 3 (Supplementary Table S3).
- 3) After excluding 463 participants with a baseline MMSE ≤ 27 or 606 participants with cognitive impairment-no dementia (CIND), results on the joint effect of diabetes and an active lifestyle on dementia remained significant (Supplementary Table S3).

SUPPLEMENTARY DATA

Supplementary Table S1. Cox regression model's hazard ratios (HR) and 95% CI of the effect of lifestyle (combining leisure activities and social network) plus diabetes on dementia.

Joint effect		n	HR (95% CI) *	p
Lifestyle	Diabetes			
Active	No	1,155	Reference	
Inactive	No	154	1.63 (0.94–2.84)	0.083
Active	Yes	160	1.93 (1.08–3.46)	0.027
Inactive	Yes	37	5.56 (2.64–11.7)	0.000

* Adjusted for baseline age, sex smoking, BMI, hypertension, cardio- and cerebrovascular conditions, depression, and *APOE ε4*.

SUPPLEMENTARY DATA

Supplementary Table S2. Cox regression model's hazard ratios (HR) and 95% CI of the joint effect of diabetes plus leisure activities, social network, or lifestyle on dementia in females and males.

Joint effect		Female			Male		
		n	HR (95% CI)*	p	n	HR (95% CI)*	p
Leisure activities index	Diabetes						
Moderate-to-high	No	615	Reference		346	Reference	
Low	No	205	2.33 (1.30–4.17)	0.005	143	2.26 (0.97–5.28)	0.060
Moderate-to-high	Yes	60	2.22 (0.90–5.47)	0.083	67	4.98 (1.49–16.6)	0.009
Low	Yes	34	4.78 (2.08–11.0)	0.000	36	3.55 (0.94–13.3)	0.061
Social network index	Diabetes						
Moderate-to-rich	No	642	Reference		370	Reference	
Poor	No	258	1.20 (0.71–2.03)	0.495	151	1.10 (0.52–2.35)	0.801
Moderate-to-rich	Yes	65	1.28 (0.55–2.99)	0.570	71	2.62 (0.94–7.28)	0.065
Poor	Yes	43	3.68 (1.73–7.84)	0.001	45	2.17 (0.70–6.73)	0.180
Lifestyle †	Diabetes						
Active	No	725	Reference		430	Reference	
Inactive	No	95	1.79 (0.93–3.45)	0.081	59	1.42 (0.50–4.03)	0.514
Active	Yes	76	1.90 (0.90–4.02)	0.094	84	2.48 (0.85–7.23)	0.096
Inactive	Yes	18	6.20 (2.34–16.4)	0.000	19	4.42 (0.85–7.23)	0.039

* Models adjusted for baseline age, sex, education, smoking, BMI, hypertension, cardio- and cerebrovascular diseases, depression, and *APOE ε4*

† Lifestyle was derived by combining leisure activities and social network indices.

SUPPLEMENTARY DATA

Supplementary Table S3. Cox regression model's hazard ratios (HR) and 95% CI of the effect of lifestyle (combining leisure activities and social network) plus diabetes on dementia after excluding participants with incident dementia during 3 years follow-up (n=96), Mini-Mental State Examination (MMSE) ≤27 (n=334), or baseline cognitive impairment-no dementia (CIND, n=605).

		Incident dementia during 3 years follow-up		MMSE ≤27		CIND		<i>p</i>
Lifestyle	Diabetes	HR (95% CI) *	<i>p</i>	HR (95% CI) *	<i>p</i>	HR (95% CI) *		
Active	No	Reference		Reference		Reference		
Inactive	No	2.16 (1.11–4.20)	0.023	1.73 (0.85–3.53)	0.128	4.29 (1.89–9.73)	0.000	
Active	Yes	2.89 (1.46–5.69)	0.002	2.27 (1.11–4.66)	0.025	4.89 (1.98–12.0)	0.001	
Inactive	Yes	3.60 (1.06–12.2)	0.040	3.80 (1.29–11.2)	0.016	17.1 (4.18–69.7)	0.000	

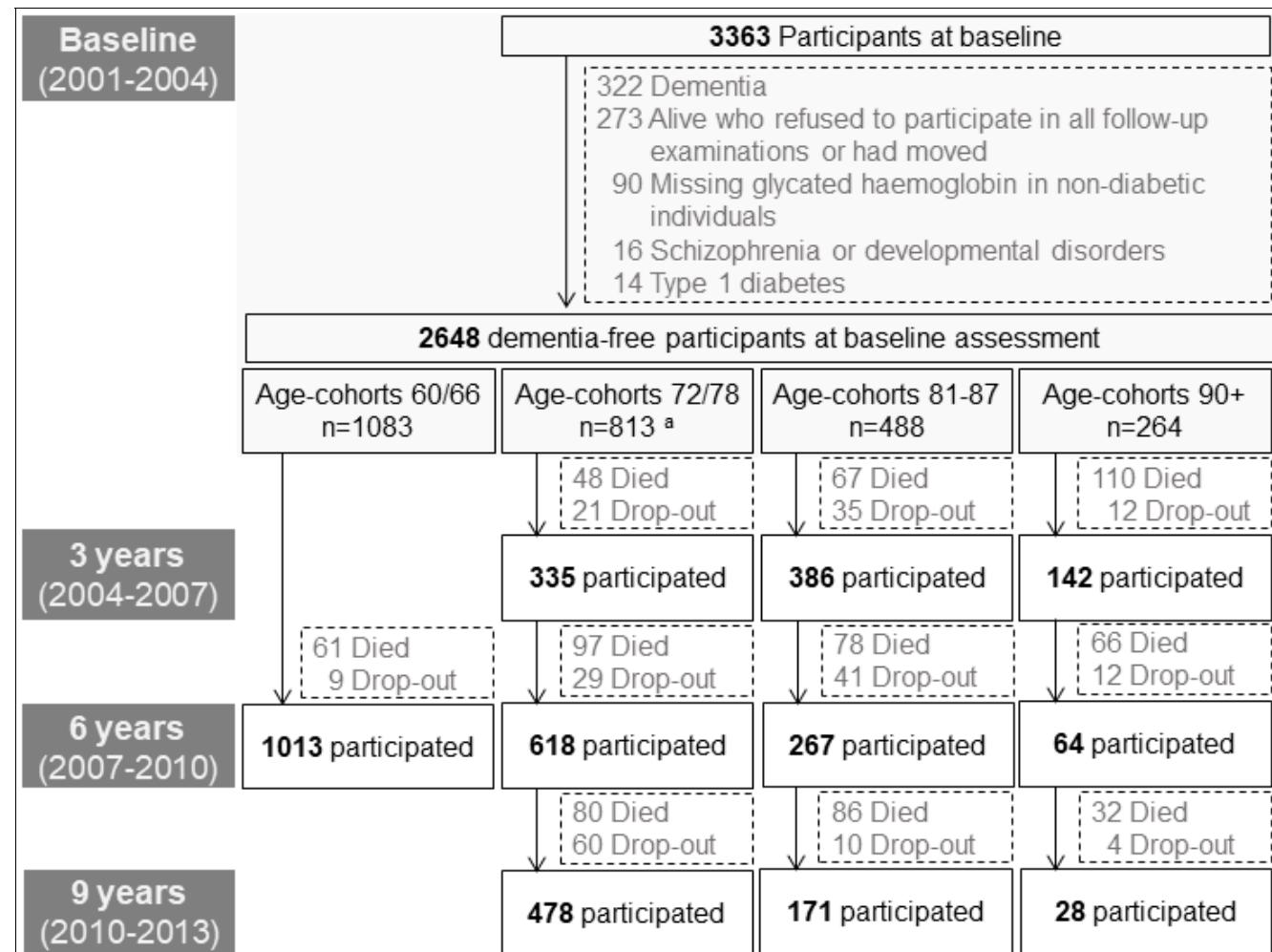
* Adjusted for baseline age, sex smoking, BMI, hypertension, cardio- and cerebrovascular conditions, depression, and *APOE ε4*.

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Supplementary Figure S1. Flowchart of study population in SNAC-K.

Reason for dropouts included refused (from participants or proxy), cancelled testing, no contact, or moved.

^a The age-cohort 78 included 404 participants who were re-assessed at 3 years follow-up, whereas for the n=409 participants in the age cohort 72 years the first follow-up was after 6 years, based on the SNAC-K study design



SUPPLEMENTARY DATA

Supplementary Figure S2. Kaplan-Meier survival curves for the joint-effect of lifestyle (combining leisure activities and social network) plus diabetes on dementia.

“Inactive” refers to a low level of leisure activities and poor social network (leisure activities index and social network index=0). “Active” refers to having at least one moderate-to-high leisure activities index or moderate-to-rich social network index. Reference group included participants who were diabetes-free and active (blue line).

