Dementia: Prevent, Reduce, Delay for Tier 2

Vicky Brown - Updated Oct 26

With references

Dementia Risk Reduction and Prevention

1

Questions

Can we prevent dementia?

Which dementia's do you think we have most potential to prevent?

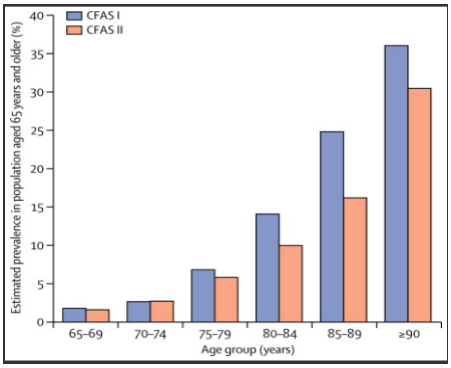
What risk factors might be modifiable?

What percentage of dementia might be preventable?

What age can people make a difference?

2

Can we prevent dementia?



Lancet 2013. A two-decade comparison of prevalence of dementia in individuals aged 65 years and older from 3 geographical areas of England; results of the Cognitive Function and Aging Study I and II (CFAS I and CFAS II). CFAS I **1989-1994**, CFAS II **2008-2011**

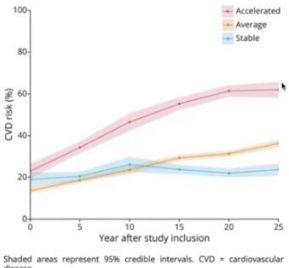
(shows drop in prevalence over 20 years. Note the total number which is not shown continues to increase as population is aging faster than incidence is dropping)

Better effect than any drug in development

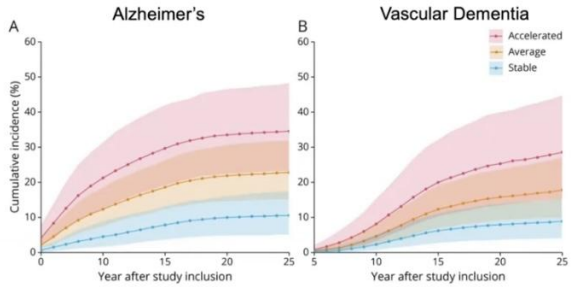
3

It doesn't just affect vascular dementia

- 1,244 Dementia-free adults (Sweden)
  - 50s-60s
- Framingham Risk Score
  - Stable
  - Average
  - Accelerated



Shaded areas represent 95% credible intervals. CVD = cardiovascular disease.



Von Cederland et al. Neurology 2022

4



5

Living Caerphilly

- Epidemiological cohort study
- Prof Elwood, MRC
- Looked at 90% of the middle aged men in Caerphilly from 1979 (2,500+)
- Baseline health then detailed review every 5 years – GP and hospital records, incident analysis
- Found for those that had 4/5 or more healthy behaviours, there was reduction of dementia by up to 65%
- (similar reductions in diabetes, heart disease, overall mortality and a 30% reduction in cancer)
- Those healthy behaviours were…

6

Healthy Behaviours In Caerphilly



7

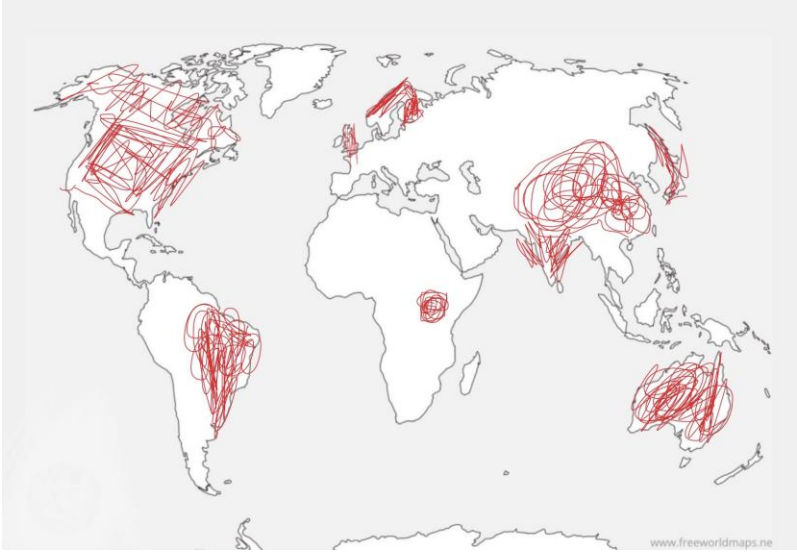
Lancet Paper



8

Location of Authors of 2024 Lancet Paper

UK
Norway
India
Australia
Brazil
USA
Finland
Uganda
Canada
Japan
China



9

Identified 14 modifiable risk factors and their PAF (Population Attributable Fraction) - the global percentage reduction in dementia prevalence if this risk factor is eliminated

TOTAL 45%

Early Life <19

Mid life >18 <66

Later life >65

Hearing Loss 7%

High LDL cholesterol 7%

Less education 5%

Social isolation 5%

Depression 3%

Traumatic Brain Injury 3%

Air pollution 3%

Physical Inactivity 2%

Diabetes 2%

Smoking 2%

Hypertension 2%

Visual loss 2%

Obesity 1%

Excessive Alcohol 1%

10

There are many, many other studies

The same risk factors

Other risk factors – diet (vit D, vit C, hyperhomocysteinuria), sleep, frailty, arrhythmias, stroke, cognitive activity, orthostatic hypotension, deprivation, HRT

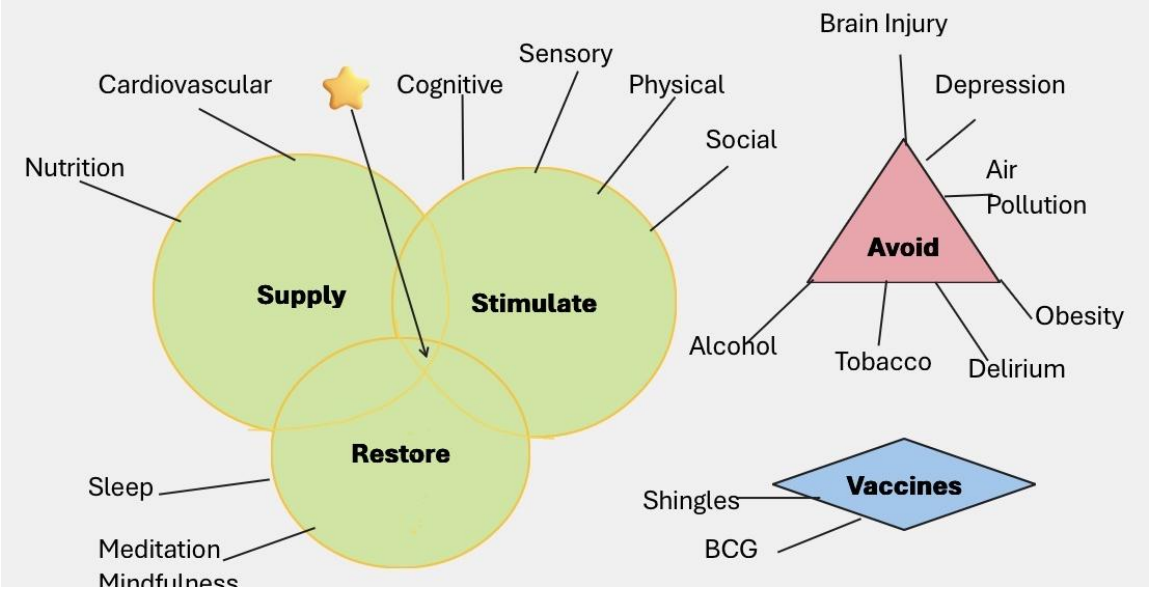
Genetics and how they interact with other risk factors

11

We can prevent dementia for a population and reduce our own risk or delay the onset

- Or at least 45% of it
- Cognitive reserve (more cells, more connections) and / or decreased damage through lifestyle?
- Never too early, (almost) never too late
- Our brains are plastic and cognitive decline is not as inevitable as we thought

12



13

How does it work?

Exercise increases the volume of muscles

Muscles produce myokines

Increases secretion of BDNF – drives growth of cortex, hippocampus

14

Concept of Cognitive Friction

Stretching yourself - language, music, work, social interaction, reading, writing, drama, art, creativity

Don't have to be good at something

Day dreaming is possibly good, being bored

Ruminating not so good, doesn't give room for more constructive thinking

15

Manipulating Immunity

1. Monoclonal Antibodies - mab drugs - treatment not prevention

2. Vaccines may play a role in prevention. Shingles and BCG may prime immune system to clear waste more effectively, dial down inflammation, reduce risk of delirium through the disease. The adjuvant may play a role AS01 adjuvant is common to several vaccines. Shingles increases stroke risk and the vaccine may lower dementia incidence partly by reducing strokes. Both need RCTs.

16

Shingles

Natural Experiment in Wales (Nature, 2025). No one born before 2.9.33 was eligible for shingles vaccine, everyone after was. Found a 3.5% difference between risk of dementia 7 years later in those born 1 week before and after that date.

Replicated in New Zealand and Australia

Later studies suggest that it seemed to slow dementia down too. No particular type of dementia stood out for being affected

17

BCG

Most of evidence come from its use in bladder cancer

Several studies, mixed results, mostly positive, stronger in people over 70. BCG in childhood seems to wear off, its midlife bladder cancer treatment that seems to help.

How? Possibly training immunity. There is a theory that amyloid beta is produced for antimicrobial effect. If fewer infections, less need for that effect.

Less evidence than shingles

18

Must remember that is not all preventable

- Somewhere between 40 and 70% is preventable
- There are some people whose dementia could never be prevented, though bad luck, unlucky genes, factors we can't change, and things we don't understand
- We don't know much about preventing Parkinsons Disease Dementia or Lewy Body Dementia or Fronto-temporal dementias

19

What about genetics?

- Dementia is so common, that just because its in your family doesn't mean you are at increased risk (unless very young onset)
- Several known AD genes – APP, PSEN1, PSEN2 and APOE4. There is widespread variance in distribution around the world
- The genes are not expressed consistently. If someone has APOE4 x 1, 3 x more likely to get AD, but if have both, risk increases to 9x.
- Expression of genes affected by sex, race, geography eg women more affected by APOE4 if have it, HRT helps
- It is very likely that lifestyle affects the epigenetic; how the genes are expressed. There are also clusterings of risk factors.

20

Any questions before we think about the next part?

21

How do we put all this into practice?
At home?
At work?
In society?

22

Understand motivational factors that may impact on the ability to make changes
Be able to encourage behavioural change in people and organisations to promote health and wellbeing, reduce risk and potentially delay the onset and severity of certain types of dementia

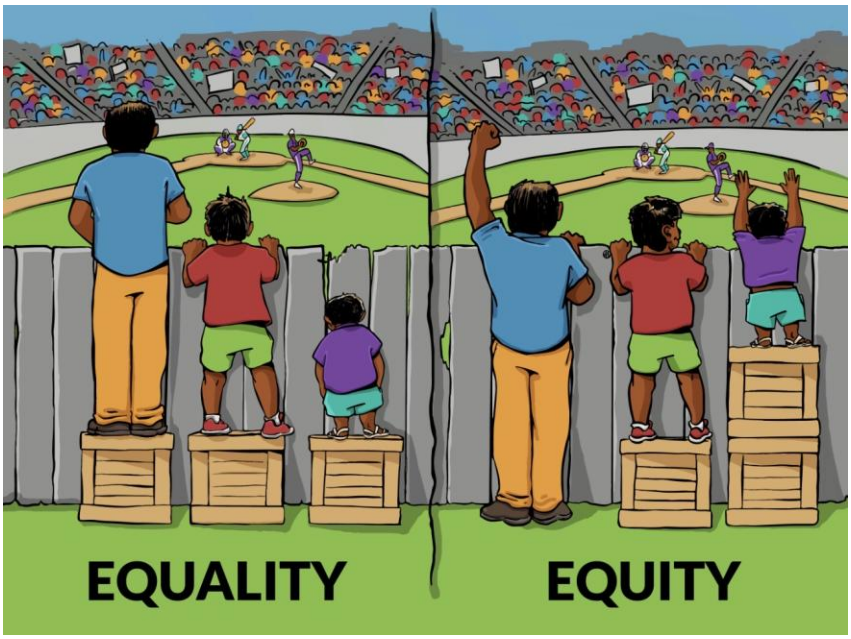
23

Motivation and Behaviour Change.
Ask questions
Understand what's important to people.
What are their priorities?
Are they ready to change, if not, what would help them want to?
How do they want to tackle it?
Agree a target - SMART

24

Tackle health inequalities and provide targeted support for underserved communities
Understand the challenges to healthy living that may be experienced by different socio-economic or under-represented groups

25



Interaction Institute for Social Change | Artist: Angus Maguire.

26

How might socio-economic factors affect people's lifestyle?
Which people might be underserved by health services?
How might ethnicity and culture affect lifestyle and risk?

What can we do about that?

27

Be able to signpost sources of health promotion information and support

28

After today, what information and support might you signpost people to?

If you didn't know, where would you ask?

29

Know how to effectively communicate messages of healthy living according to the abilities and needs of individuals

30

- Language that is appropriate to the person's circumstances
- Inclusive language that recognises preferences
- Promote autonomy
- Help people understand links between their own lifestyle and particular risks

31

If you have questions or have a passion for prevention, my email is vickybrown1967@gmail.com

32

References

NHS England Transformation Framework – The Well Pathway for Dementia.

Dementia incidence rates are decreasing in western countries… (despite higher prevalence due to larger older population)
Twenty Seven Year Time Trends in Dementia Incidence in Europe and the US (Alzheimer's Cohorts Consortium). Neurology. Wolters et al. Aug 4 2020; 95 (5)

Incidence of Dementia over 3 decades in the Framingham heart study. NEJM. Satizabal et al. 2016 Feb 11:374(6):523-32 (only found decreased incidence in people with High School Diploma or more, not just about vascular risk factors)

A two-decade comparison of prevalence of dementia in individuals aged 65 years and older from 3 geographical areas of England; results of the cognitive function and aging study I and II. Matthews et al. The Lancet. 2013 Oct 26; 382 (9902): 1405-12

….but increasing in China
Epidemiology of Alzheimer's disease and other forms of dementia in China 1990-2010; a systematic review and analysis. Chan et al. The Lancet. 2013 June 08; 382 (9882); 2016-23

The China Alzheimer Report 2022. Ren et al. General Psychiatry 2022; 35:e 100751

33

Can lifestyle make a difference?

Can Lifestyle make a difference?

Healthy lifestyles reduce the incidence of chronic diseases and dementia: evidence from the Caerphilly cohort study. Peter Elwood et al. PLoS One 2013. 9;8 (12). 4/5 or 5/5 healthy behaviours (weight, exercise, not smoking, vegetables, drinking little) – 68% reduction in all cause dementia cf those who had 0/5 or 1/5.

Dementia prevention, intervention and care: 2020 report of the Lancet commission. Livingston et al. Volume 396. Issue 10248, p413-446. Aug 08 2020.

Evidence-based prevention of Alzheimer's disease; systematic review and meta-analysis of 243 observational prospective studies and 153 randomised control trials. Jin-Tai Yu et al. J Neurol Neurosurg Psychiatry. Nov 2020

Effective interventions for potentially modifiable risk factors for late onset dementia: a costs and cost effectiveness modelling study. Mukadem et al. Lancet Healthy Longev 2020; 1; e13-20

Healthy lifestyle and the risk of Alzheimer Dementia. Dhana et al. Neurology 2020 Jul 28, 95(4) 374-383 – Chicago Health and Aging Project, combined 2 longitudinal studies, similar findings to Caerphilly – have 4/5 or 5/5 healthy behaviours to halve risk cf those with 0/5 or 1/5

The brain health imperative in the 21st century – a call to action. The AAN Brain Health Platform and Position Statement. Neurology. 2023; 101: 1-10 'The era of preventative neurology has arrived'

34

Mechanisms

Demand coupling drives neurodegeneration: a model of age related cognitive decline and dementia. Turknett and Wood. Cells. 2022, 11, 2789

Is the lack of appropriate cognitive demand the primary driver of dementia risk? Turknett and Wood. Lifestyle Med. 2022, 3:e70

The adverse effects of modifiable dementia risk factors on cognition amplifies across the adult lifespan. La Plume et al. Alz and Dem. Volume 14, issue 1, e12337

35

Nutrition

MIND diet associated with reduced incidence of Alzheimer's disease. Morris et al. Alzheimer's dement. 2015 Sep 11 (9) 1007-1014

Association between consumption of ultra-processed foods and cognitive decline. Goncalves et al. JAMA neurol. 5.12.2022

Meat consumption and risk of incident dementia; cohort study of 493,888 UK Biobank participants. Zhang et al. Am J Clin Nut. Vol 114, issue 1, July 2021. 175-184

Anemia and the risk of cognitive impairment; an updated systemic review and meta-analysis. Kung et al. Brain Sci. 2021, 11, 777

Vitamin D deficiency as a risk factor for dementia and Alzheimer's disease; an updated meta-analysis. BMC Neurol. 284 (2019) Chai et al

Brain atrophy in cognitively impaired elderly: the importance of long chain omega 3 fatty acids and B vitamin status in a randomised controlled trial. Jerneren et al. Am J Clin Nut. 2015. Jul

Vitacog

FINGERS

36

Exercise

Optimal dose and type of exercise to improve cognitive function in older adults: a systemic review and Bayesian model-based network meta-analysis of RCTs. Gallardo-Gomez et al. Aging Res Rev. 2022 April.

Exercise training increases size of hippocampus and improves memory. Erickson KL et al. PNAS 2011; 108 (7): 3017 – the first study that showed that an exercise programme (or anything!) could increase hippocampal volume

Temporal changes in cardiorespiratory fitness and risk of dementia incidence and mortality: a population based prospective cohort study. Tari et al. Lancet Public Health. 2019

Reduced lean mass in early Alzheimer disease and its association with brain atrophy. Burns et al. Archives Neurol. 2010; 67(4) 428-433

Aging-related changes in fluid intelligence, muscle and adipose mass, and sex specific immunologic mediation: a longitudinal UK Biobank study. Klinedinst et al. Brain, behaviour and immunity. 2019

37

More exercise references

Functional and / or structural brain changes in response to resistance exercises and resistance training lead to cognitive improvements – a systematic review. Herold et al. Eur Rev of Aging and Phys Act. 2019.

The Study of Mental and Resistance Training (SMART) Study – Resistance training and / or cognitive training in mild cognitive impairment. A randomised double-blind, double sham controlled trial. Fiatarone Singh et al. JAMDA 2014

Therapeutically relevant structural and functional mechanisms triggered by physical and cognitive exercise. Suo et al. Mol Psych. 2016. (21) 1633-1642

Dancing or Fitness Sport? The effects of two training programs on hippocampal plasticity and balance abilities in healthy seniors. Rehfeld. Front Hum Neurosci. Volume 11 – 2017

Systemic review and meta-analysis investigating moderators of long term effects of exercise on cognition in healthy individuals. Ludyga et al. Nature Human Behav. 4. 603-612

38

Keep learning and thinking

Does postponing retirement affect cognitive function? A counterfactual experiment to disentangle life course risk factors. Hale et al. SSM population health. Vol 15. Sept 21

A nationwide Swedish study of age at retirement and dementia risk. Sundstrom et al. Int J Ger Psych. Vol 35, Issue 10. June 2020.
The cognitive functioning of older adult instrumental musicians and non-musicians. Strong et al. Aging, Neuropsychology and Cognition. Vol 26. 2019

Ten years of BrainAGE as a neuroimaging biomarker of brain aging: what insights have we gained. Franke and Gaser. Front Neurol. 14.8.19. Vol 10.

Acquiring 'the Knowledge' of London's layout drives structural brain changes. Woollett and Maguire. Current Biology. 2011

39

Importance of Sensory Input

Association between cataract extraction and development of dementia. Lee et al. JAMA Internal Med. 2021

Covered in depth in Lancet 2020 paper mentioned near top

Overnight olfactory enrichment using an odorant diffuser improves memory and modifies the uncinate fasiculus in older adults. Woo et al. Frontiers Neurosci 24.7.23

40

Social Activity

The association between social engagement, loneliness and risk of dementia; a systematic review and meta-analysis. Penninkilampi et al. J Alz Dis. 2018.

Late life engagement in social and leisure activities is associated with a decreased risk of dementia; A longitudinal study from the Kungsholmen Project. Am J Epid. Vol 155, Issue 12

41

Restore: Sleep, Meditation and Mindfulness

Sleep drives metabolite clearance from the adult brain. Xie et al. Science. 2013
Beta amyloid accumulation in the human brain after one night of sleep deprivation. Shokri-Kojori et al. PNAS 115(17) 4483-4488

The sleep-deprived human brain. Krause et al. Nat Rev Neurosci. 2017.

Sleep, cognitive impairment and Alzheimer's disease: a systematic review and meta-anaylsis. Bubu et al. Sleep. Vol 40, issue 1, Jan 2017.

Association of sleep duration in middle and old age with incidence of dementia. Sabia et al. Nature Communications 12, 2021.

The underlying anatomical correlates of long-term mediation; larger hippocampal and frontal volumes of grey matter. Luders et al. Neuroimage. 2016
Meditation experience is associated with increased cortical thickness. Lazar et al. Neuroreport. 2005.

Mindfulness practice leads to increases in regional brain grey matter density. Holzel. Psychiatry research. 2011

42

Stress

Association of stress with risk of dementia and mild cognitive impairment: a systematic review and meta-analysis. Franks et al. Journal of Alzheimer's Disease. 2021.

Psychosocial stress at work is associated with increased dementia risk in later life. Wang et al. Alzheimer's and Dementia. 2012

This job is (literally) killing me: a moderated-mediated model linking work characteristics to mortality. Gonzalez-Mule and Cockburn. Journal of Applied Psychology. 2020.

43

Smoking

There's more than one reference to this!

Smoking is associated with an increased risk of dementia: a meta-analysis of prospective cohort studies with investigation of potential effect modifiers. Zhong et al. PLOS One. 2015.

44

Alcohol

Long term effects of alcohol consumption on cognitive function. A systematic review and dose response analysis of evidence published between 2007 and 2018. Systematic Reviews. 2020.

Topiwala A et al. Moderate alcohol consumption as a risk factor for adverse brain outcomes and cognitive decline: longitudinal cohort study. BMJ 2017: 357
Associations between alcohol consumption and grey and white matter volumes in the UK Biobank. Daviet. Nature Communications. 13. 2022

45

Head Injury

Neurodegenerative disease among male elite football (soccer) players in Sweden: a cohort study. Ueda et al. Lancet Public Health 2023; 8 e 256-65

46

Diabetes

HbA1c, diabetes and cognitive decline: the English Longitudinal study of aging. Zheng et al, Diabetologia (2018) 61; 8390848

47

Toxins

B vitamin intakes modify the association between particulate air pollutants and incidence of all-cause dementia: findings from the women's health initiative memory study. Chen et al. Alzheimer's Dement Nov 22

Asher et al. Periodontal health, cognitive decline and dementia: A systematic review and meta-analysis of longitudinal studies. September 2022, Journal of the Americal Geriatrics Society Vol 70 issue 9 2695-2709

Beydoun et al Clinical and Bacterial markers of periodontitis and their association with incident all cause and Alzheimer's disease dementia in a large national survey. Alzheimer's dis. 2020: 75 (1): 157-172

BMI in midlife and dementia: systematic review and meta-regression analysis of 589,649 men and women followed in longitudinal studies. Albanese et al. Alzheimers Dement (Amst) 2017; **8**:165-178

48

Genetics

I really like the US NIH, National institute on Aging 'Alzheimer's Disease Genetics Fact Sheet'. Its available at https://www.nia.nih.gov/health/genetics-and-family-history/alzheimers-disease-genetics-fact-sheet

APOE4 is a major susceptibility gene for Alzheimer's Disease. Roses and Saunders. Current Opin Biotechnol1994;5(6):663-7

Alzheimer's Disease; the cholesterol connection. Puglielli et al Nat Neurosci.2003;6(4):345-51

Genetic Studies of Human Apolipoprotein E polymorphism on quantitive levels of lipoproteins in Nigerians. Sepehrnia et al Am J Hum Genet 1989;45(4):586-91

Wisconsin Longitudinal Study. Alzheimers Dement. 2025 (conference abstract) – looked at the Lancet 14 risk factor model and stratified by ApoE4 status – found effects of lifestyle factors differed by genetic risk. Diabetes increased the risk for ApoE4 carriers whereas hypertension possibly reduced risk (? Not sure how that works)

49

HRT

Hormone Replacement Therapy and Dementia Risk Among Postmenopausal Women; Identifying Responsive Subgroups in the UK Biobank. Squires et al. Alzheimer's And Dementia. Volume 22. Issue 8. e71679 Study looking at 183,000 Womens data in the Biobank, F/U mean 13 years. HRT use was associated with lower all cause dementia, stronger effect in surgical menopause APOE4 carriers and women with lower endogenous oestrogen exposure.

50

Multidomain Lifestyle Interventions

FINGER trial (Finnish Geriatric Intervention Study to Prevent Cognitive Impairment and Disability) – published 2015, but updates since. Looked at diet, activity, cognitive training, social activity and stress management and cardiovascular risk management (five fingers). Showed good response in people with APOE4 too.
Alzheimers Res Ther. 2024 Jun 7;16:122. doi: 10.1186/s13195-024-01482-z
Effects of intensive lifestyle changes on the progression of mild cognitive impairment or early dementia due to Alzheimer's disease: a randomized, controlled clinical trial
Dean Ornish [1,2,✉]et al (modest improvements in cognitive function and biomarkers, only 51 participants, 20 weeks, with strict lifestyle protocol)

Effects of Structured v Self Guided multidomain lifestyle interventions for global cognitive function, The US POINTER randomized Clinical Trial. JAMA. 28 July 2025. > 2000 older adults at risk of cognitive decline had structured lifestyle intervention of regular moderate to high intensity exercise, MIND diet, cognitive challenge, social engagement and cardiovascular treatment as necessary resulted in stat signif improvement in global cognition over 2 years

LIGHT trial (van Gils et al, Alz Res Ther, 8 Jan 26). RCT of lifestyle coaching, with vouchers for 'brain healthy services' and risk self-management in memory clinic patients with MCI in Netherlands, n=300. Ongoing

51

Miscellaneous

Get a dog? Taniguchi et al Association of dog and cat ownership with incident frailty among community dwelling elderly Japanese. Sci Rep 2019, 9, 18604

Taniguchi et al Protective effects of dog ownership against the onset of disabling dementia in older community dwelling Japanese: A longitudinal study. Prev Med Rep 2023: 36: 102465

Coaching? Yaffe et al. Effect of Personalised Risk-Reduction strategies on cognition and dementia risk profile among older adults. JAMA In Med. Nov 27, 2023

52