Editorial

Population-Based Approaches to Dementia Prevention

Claire E. Sexton[a,b] and Kristine Yaffe[c,d,*]

[a]*Department of Neurology, Global Brain Health Institute, Memory and Aging Center, University of California, San Francisco, San Francisco, CA, USA*
[b]*Department of Psychiatry, University of Oxford, Oxford, UK*
[c]*Department of Psychiatry, Neurology, and Epidemiology, Global Brain Health Institute, University of California, San Francisco, San Francisco, CA, USA*
[d]*San Francisco Veterans Affairs Health Care System, San Francisco, CA, USA*

The International Research Network on Dementia Prevention (IRNDP) supplemental issue contains a number of population-based approaches to dementia prevention, including research that focuses on the initial identification of risk factors [1] and the modelling of their impact on rates of dementia [2], policy approaches [3] and intervention studies [4], and the continued evaluation of incidence rates [5]. All of these approaches are critical for the understanding of dementia risk and how we intervene at a population level.

With regard to the initial identification of risk factors, Mc Fall et al. [1] identify a range of modifiable risk factors that discriminate stable memory aging and declining memory aging from normal memory aging. Stable memory aging was associated with more education, living with someone, more social activity, higher body mass index, higher heart rate, and fewer depressive symptoms. In contrast, declining memory aging was associated with less social activity, less novel cognitive activity, less self-maintenance activity, higher grip strength, higher heart rate, and slower gait. Interestingly, those factors associated with stable memory aging are not simply the reverse of those factors associated with declining memory aging. The implication that promoting successful cognitive aging and reducing risk of cognitive decline are not one and the same is in line with the results of previous studies [6, 7], and has important implications for both research studies and policy approaches.

The majority of research that has modelled the impact of modifiable risk factors to date has concentrated not on the potential increase in the proportion of maintainers, but the potential decrease in the proportion of cases of dementia. Specifically, studies have calculated the proportion of cases of dementia that can be attributable to a risk factor, the population-attributable risk (PAR) of dementia, which is a function of both the relative risk associated with a factor and its prevalence in the population [8, 9]. As the prevalence of risk factors differs greatly from country to country, it is therefore important that the impact of modifiable risk factors is modelled not only in global terms, but also on a national basis. To this end, Oliveira et al. [2] report the PAR of dementia in

*Correspondence to: Kristine Yaffe, MD, 4150 Clement Street, 181G, San Francisco, CA 94121, USA. E-mail: kristine.yaffe@ucsf.edu.

Mozambique, Brazil, and Portugal. While these three countries are culturally related, key differences exist in terms of demographics and economic conditions. Prevalence of low educational attainment was similarly high in all three countries (ranging from 44.9% in Mozambique to 46.4% in Portugal), resulting in PAR of ∼21–22%. In Brazil and Portugal, physical inactivity outranked educational attainment as the number one factor in terms of PAR, with prevalence rates of 46.0% and 53.9% resulting in PARs of 27.4% and 30.7%, respectively. In Mozambique, however, physical inactivity rates were only 9.3%, resulting in a PAR of 7.1%. Instead, educational attainment was the highest-ranking risk factor in terms of PAR, with smoking coming in second with a prevalence of 21.4% and PAR 11.2%. Such differences contribute to the proportion of cases that could be prevented via a reduction in seven risk factors being greatest in Portugal (40.1%), followed by Brazil (32.3%), and then Mozambique (24.4%), and illustrates the importance of nationally tailored risk reduction research studies and policies.

Collins et al. [3] review dementia prevention policies and strategies, and their implementation in primary healthcare services, in England. Encouragingly, there is evidence that national dementia policies are filtering to regional and local levels. For example, in 2009, 'Living Well with Dementia: A National Dementia Strategy' first proposed that the message that "*What is good for your heart is good for your brain*" should be embedded in the National Health Service (NHS) Health Checks program, which is available to adults aged 40 to 74 years in England. Ten years on, Collins et al report that, at a local level, NHS Health Checks are the most frequent action included in statutory strategies that target local populations as a whole, and non-statutory strategies that target high need groups and programs. However, their review also highlights substantial scope for improvement, with initiatives often concentrating solely on vascular risk factors, and substantial heterogeneity in implementation reported.

An additional consideration for nationally-tailored programs is the extent to which their target population can be readily identified. In their review of vascular mild cognitive impairment (MCI), Meguro and Dodge [4] report how the design of the Osaki-Tajiri and Kurihara Projects in Japan was informed by the likelihood that many cases of vascular MCI remain undiagnosed. These projects provided free assessments and travel to aid in early diagnosis, before offering interventional studies that examined the efficacy of cognitive stimulation, physical exercise, and group reminiscence on cognitive outcomes, physical ability and quality of life. Compared with the control group, all three interventions were associated with improvements in Trail Making Test A, word fluency and quality of life. Additionally, the cognitive stimulation intervention increased Mini-Mental State Examination scores, and the physical activity intervention improved walking speed [10]. With substantial stigma still attached to cognitive decline and dementia in many countries, such thoughtful approaches to recruitment are vital to limit the number of people experiencing symptoms who remain "hidden in the communities".

Ultimately, the success or failure of dementia prevention research and policies will be reflected in incidence rates. Indeed, there is some evidence to suggest that dementia incidence rates are declining, in parallel to improvements in cardiovascular health [11]. Less is known, however, regarding the temporal trends of MCI. In this issue, Derby et al. [5] report that rates of amnestic MCI have remained fairly stable in the population-based Einstein Aging Study. That is, there was no evidence of a change in amnestic MCI rates for individuals born between 1915 and 1935. Given the context of decreasing incidence rates for dementia within this cohort [12], the relative stability of rates of amnestic MCI may indicate that secular trends in risk factors may slow the transition from amnestic MCI to Alzheimer's disease, rather than the transition from healthy aging to amnestic MCI. As our knowledge of modifiable factors expands and policy approaches are refined and implemented, such cohort studies will play a key role in evaluating the success within this field.

To summarize, in the absence of disease-modifying treatments, population-based approaches examining dementia prevention have the potential to play a key role in reducing the incidence and impact of dementia worldwide. The studies included in this issue indicate that nuanced approaches to dementia prevention are needed, given that different modifiable factors may promote successful cognitive aging and reduce risk of decline [1], the prevalence of such factors varies by country [2], implementation of policies can vary at national, regional and local levels [3], target populations are often undiagnosed and hard to reach [4], and temporal trends may differ with outcome [5]. Despite such challenges, there is a great deal of opportunity in this field, and carefully tailored approaches that translate research findings

into policy and practice have the potential to be transformative.

ACKNOWLEDGMENTS

REFERENCES

[1] McFall GP, McDermott KL, Dixon RA (2019) Modifiable risk factors discriminate memory trajectories in non-demented aging: Precision factors and targets for promoting healthier brain aging and preventing dementia? *J Alzheimers Dis* **70**, S101–S118.

[2] Oliveira D, Jun Otuyama L, Mabunda D, Mandlate F, Gonçalves-Pereira M, Xavier M, Laks J, Ferri CP (2019) Reducing the number of people with dementia through primary prevention in Mozambique, Brazil, and Portugal: An analysis of population-based data. *J Alzheimers Dis* **70**, S283–S291.

[3] Collins R, Silarova B, Clare L (2019) Dementia primary prevention policies and strategies and their local implementation: A scoping review using England as a case study. *J Alzheimers Dis* **70**, S303–S318.

[4] Meguro K, Dodge HH (2019) Vascular mild cognitive impairment: Identifying disease in community-dwelling older adults, reducing risk factors, and providing support: The Osaki-Tajiri and Kurihara Projects. *J Alzheimers Dis* **70**, S293–S302.

[5] Derby CA, Katz MJ, Rozner S, Lipton RB, Hall CB (2019) A birth cohort analysis of amnestic mild cognitive impairment incidence in the Einstein Aging Study (EAS) cohort. *J Alzheimers Dis* **70**, S271–S281.

[6] Yaffe K, Fiocco AJ, Lindquist K, Vittinghoff E, Simonsick EM, Newman AB, Satterfield S, Rosano C, Rubin SM, Ayonayon HN, Harris TB, Health ABC Study F the HA (2009) Predictors of maintaining cognitive function in older adults: The Health ABC study. *Neurology* **72**, 2029–2035.

[7] Zahodne LB, Schupf N, Brickman AM, Mayeux R, Wall MM, Stern Y, Manly JJ (2016) Dementia risk and protective factors differ in the context of memory trajectory groups. *J Alzheimers Dis* **52**, 1013–1020.

[8] Barnes DE, Yaffe K (2011) The projected effect of risk factor reduction on Alzheimer's disease prevalence. *Lancet Neurol* **10**, 819–828.

[9] Norton S, Matthews FE, Barnes DE, Yaffe K, Brayne C (2014) Potential for primary prevention of Alzheimer's disease: An analysis of population-based data. *Lancet Neurol* **13**, 788-7.

[10] Nakatsuka M, Nakamura K, Hamanosono R, Takahashi Y, Kasai M, Sato Y, Suto T, Nagatomi R, Meguro K (2015) A cluster randomized controlled trial of nonpharmacological interventions for old-old subjects with a clinical dementia rating of 0.5: The Kurihara Project. *Dement Geriatr Cogn Dis Extra* **5**, 221–232.

[11] Satizabal CL, Beiser AS, Chouraki V, Chêne G, Dufouil C, Seshadri S (2016) Incidence of dementia over three decades in the Framingham Heart Study. *N Engl J Med* **374**, 523–532.

[12] Derby CA, Katz MJ, Lipton RB, Hall CB (2017) Trends in dementia incidence in a birth cohort analysis of the Einstein Aging Study. *JAMA Neurol* **74**, 1345.