BJPsych | The British Journal of Psychiatry (2021)
218, 252–253. doi: 10.1192/bjp.2020.119

Commentary

Lowering dementia risk and slowing progression of disease: the role of cognitive reserve and cognitive training†

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Summary

Almeida-Meza et al found an inverse correlation between cognitive reserve (associated with educational level, complexity of occupations and leisure activities) and dementia incidence. We suggest clarifying studies using their data-set and consider what can be done to modify socioeconomic inequalities that affect cognitive reserve or to slow early dementia.

Keywords

Cognition; cognitive behavioural therapies; dementia; epidemiology; psychosocial interventions.

In their study of cognitive reserve,[1] Almeida-Meza et al used measures from the Cognitive Reserve Index questionnaire to categorise participants in the English Longitudinal Study of Ageing as having low, medium and high cognitive reserve. The questionnaire measures educational attainment, years spent in one of five types of work activity: (a) unskilled manual labour, (b) skilled manual labour, (c) skilled non-manual or technical work, (d) professional occupation, (e) highly intellectual occupation; and time spent in stimulating leisure activity such as reading, attending museums and participating in sports. A high cognitive reserve is characterised as having a college degree, a professional occupation and using leisure time to read or engage in intellectually stimulating activity.

The study revealed that, in a base model adjusting for gender and marital status, compared with low cognitive reserve, medium cognitive reserve was associated with a 35% lower risk for dementia, and high cognitive reserve was associated with a 52% lower risk for dementia. After fully adjusting for all confounders, these associations remained significant, with medium cognitive reserve associated with a 27% lower dementia risk and high cognitive reserve associated with a 35% lower dementia risk. Additional important findings related to risk factors for incident dementia include evidence that wealth explained the largest percentage (17–23%) of excess risk for dementia for individuals with medium and high cognitive reserve. This is striking compared with the 2–3% explained by coronary heart disease, type 2 diabetes, stroke and hypertension, and much greater than the 4–6% explained by smoking and 9–10% explained by depression.

The authors computed separate analyses for incident dementia and incident Alzheimer's disease, constructs measured by self-reported physician diagnoses and informant questionnaires. Of all dementia cases, 20% were attributed to Alzheimer's disease, which is much lower than expected. Point estimates suggest a stronger association between cognitive reserve and lower risk of dementia as compared with lower risk for Alzheimer's disease. Additional research in other cohorts is needed to confirm this finding.

Revisiting the cohort data

Several methodological limitations could be addressed in a subsequent analysis of the cohort data. The distribution of covariates by cognitive reserve level would help interpret results and it would be useful to report an unadjusted model of cognitive reserve and incident dementia. Participants with less education had more missing data, and Fig. 1 in the paper indicates substantial exclusion of participants owing to missing data on smoking and depression.[1] Therefore, a model that includes these participants with a dummy variable indicating missingness for these variables should reveal whether attrition and non-random missingness biased study results. If engaging in leisure activity changes with age, it would be important to determine whether results differ when covariates are treated as time dependent in survival analysis.

Because the impact of cognitive reserve may diminish with age, future studies should report the association of cognitive reserve and incident dementia in more narrow age-stratified analyses comparing results, for instance, in those 50–65 years of age, 66–75 years of age and >75 years of age. This would reveal whether cognitive reserve has greater impact on reducing risk for early-onset dementia or whether cognitive reserve is better characterised as a resource that slows the normal cognitive decline expected in the sixth, seventh and eighth decades of life.

Improving the population's cognitive reserves: is a public health programme realistic at present?

This is not the first study to demonstrate the association between socioeconomic factors and incident dementia in the English Longitudinal Study of Ageing. A 12-year follow-up study of this cohort provided similar results, in that wealth was the strongest socioeconomic factor associated with incident dementia.[2] Almeida-Meza et al suggest that cognitive reserve is modifiable through lifelong learning, participating in social networks and leisure activities. Although theoretically true, opportunities for modifying cognitive reserve are limited for persons without wealth who have few educational opportunities and less time and money for leisure and social activity. This raises the question of whether modifying cognitive reserve in the absence of wealth or, even worse, in an impoverished environment is even possible.

† Commentary on… Markers of cognitive reserve and dementia incidence in the English Longitudinal Study of Ageing. See this issue.

https://doi.org/10.1192/bjp.2020.119 Published online by Cambridge University Press

Opportunities for achieving high educational levels and subsequently an occupation involving intellectual activity often begin with the family environment. Families with more economic resources can pay for advanced education and launch their offspring into professions that involve leadership and complex reasoning. In addition to wealth allowing for more leisure time, parents pass on genes, values and interests (all likely correlated with the parents' higher income) that perpetuate an advantage in cognitive reserve. In contrast, persons raised in low-income families have fewer opportunities for higher education and are subsequently less likely to obtain advanced degrees and employment in a profession with high intellectual demands. Almeida-Meza et al[1] interpret their results as a call to action for public health interventions that encourage lifelong learning and leisure activity. This is a major challenge. Attempts to enhance opportunities for learning during childhood have not solved the incessant nature of poverty, low income and fewer opportunities for professional careers.

Although we agree with Almeida-Meza et al's conclusion that public health interventions to reduce dementia may require lifelong learning and participation in social and leisure activities, implementing such change may require intervention at the federal level. We could envision a public health effort similar to those launched to encourage smoking cessation, designed to raise awareness about potential benefits of engaging in cultural activities, reading and learning as a means of reducing dementia risk. Although a national public health effort may not be realised with many competing public health concerns (e.g. COVID-19, opioid epidemic, obesity epidemic), as a clinical intervention, there is promise in slowing the progression of dementia through engaging patients in social and educational activities collectively referred to as cognitive training.

Cognitive training in early and moderate dementia: an achievable goal

An excellent example of the utility of cognitive training and exercise to slow or even improve cognitive function in persons at early risk for dementia is the Finnish Geriatric Intervention Study to Prevent Cognitive Impairment and Disability (FINGER) study.[3] Equally exciting has been the improvement in cognition seen in persons with moderate dementia who are exposed to cognitive stimulation therapy (CST). CST was developed in the UK and is recommended for use in persons with moderate dementia by the National Institute for Health and Care Excellence (NICE) as a cost-effective therapy for dementia.[4] CST improves cognition and quality of life more than any drug available for treating dementia. After the 7-week induction period, maintenance CST for 6 months appeared still to have positive effects on quality of life and cognition. In the USA, CST has been shown to improve and maintain cognition and quality of life for at least 2 years.[4] Similar non-pharmacological cognitive training programmes (e.g. SAIDO learning therapy in Japan[5]) have been shown to enhance cognition, reduce the need for help in activities of daily living and improve cost-effectiveness of nursing home care over 6 months in persons with Alzheimer's disease by concentrating on improving working memory. Overall, these studies suggest that the risk of cognitive decline and incident dementia could be reduced by financial resources and lifetime learning. With many competing demands for public health improvements, it is difficult to envision successful implementation of a global or national public health intervention that realises equal opportunities for wealth and education. However, focused efforts to increase adoption and access to cognitive training offers a feasible approach to slow the progression of dementia and maintain quality of life for those in the early stages of this disease.

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First received 18 Mar 2020, final revision 12 May 2020, accepted 21 May 2020

Author contributions

J.F.S. and J.E.M. developed the approach, first draft and revisions. Both authors contributed to the final version.

Declaration of interest

None.

ICMJE forms are in the supplementary material, available online at https://doi.org/10.1192/bjp.2020.119.

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https://doi.org/10.1192/bjp.2020.119 Published online by Cambridge University Press