Response to commentary on "The relationship of Bilingualism to Cognitive Decline: The Australian Longitudinal Study of Ageing".

Short Title: Bilingualism and cognitive decline commentary

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We thank Wei Xing Noah Toh and colleagues for their interest in our paper on bilingualism and cognitive decline[1]. We agree with the authors who say verbal measures of executive function which we used in our paper, may bias results against those for whom English is not a first language. We have discussed this as a limitation in the paper. The authors also point out that MMSE score is likely to be affected by education, which is why we adjusted for education in our linear regression model investigating the effect of bilingualism on MMSE score and found no significant difference of bilingualism once education was taken into account. This is not surprising as our analysis was of decline and therefore baseline function on the MMSE was taken into account. We also checked for collinearity between MMSE and education-related variables before fitting our models. The MMSE does not, as the authors point out, measure Executive Function (EF) but it is still a well validated measure of cognitive decline which is why it was suited for our primary analysis and why we included tests of EF that were available in this cohort, in a separate analysis. We agree that the measure of bilingualism was coarse-grained in this cohort but it is rare for cohort studies to measure bilingual status at all. Our circumspect conclusion takes this into account and states that "bilingualism is complex and that simply speaking two languages does not protect from cognitive decline or enhance executive function. The precise pattern of language use in bilingual speakers may be critical and certainly such information is necessary to more fully disentangle the longer-term neuroprotective effect of bilingualism". Mukadam et al. (2017) further investigated this topic in their systematic review of bilingualism and cognitive decline and again concluded that bilingualism itself is not protective against cognitive decline when analyses from cohort studies are appropriately adjusted for education and socioeconomic status[2]. We would welcome future research that could measure the

more fine-grained effects of bilingualism, comparing, for example, bilinguals who

frequently switch between different languages and those who use their languages in

separate environments.

1.   Mukadam N, Jichi F, Green D, Livingston G. The Relationship of Bilingualism to Cognitive Decline: the Australian Longitudinal Study of Ageing International Journal of Geriatric Psychiatry. 2018;33(2):e249-e56.
2.   Mukadam N, Sommerlad A, Livingston G. The relationship of bilingualism compared to monolingualism to the risk of cognitive decline or dementia: a systematic review and meta-analysis. Journal of Alzheimer's Disease. 2017;58(1):45-54.