Physical activity, sleep duration, and cognitive ageing

Authors' reply

We thank Wenming Shi for his letter, which suggests important areas for future research on this topic.

As the number of hours in a day is finite, an increase in sedentary behaviour necessitates a decrease in sleep or physical activity. Because our study examines time spent sleeping and doing physical activity, adjusting for time spent being sedentary, which can be inferred from sleep and physical activity duration, is redundant. The isotemporal substitution methods used in the paper cited by Shi allow sleep, physical activity, and sedentary behaviour to be examined simultaneously,[1] but require objective measurement of 24-hour movement behaviours, and availability of longitudinal data is limited. Furthermore, associations between sedentary behaviour and cognitive function are complex; some sedentary behaviours (eg, puzzles and computer use) have been associated with better cognitive performance,[2,3] whereas others (eg, watching television) have been associated with worse cognitive performance.[3] As such, although not the focus of our Article, the role of sedentary behaviour in cognitive ageing poses many areas to explore in future work.

The question of adverse childhood experiences is also interesting. A previous study using the English Longitudinal Study of Ageing examined associations between adverse childhood experiences and memory performance and decline, and found adverse childhood experiences were only marginally associated with memory performance and were not associated with 10-year memory decline.[4] Furthermore, little evidence exists to suggest that adverse childhood experiences affect interactions between sleep and physical activity, which were the primary focus of our study. As such, not including adverse childhood experiences is unlikely to have substantively affected our results, but is a worthy consideration for future research.

Finally, we agree that examining effect modification by *APOE* status is an interesting next step and will require a study population of sufficient size to examine the three-way interactions between sleep, physical activity, and *APOE* with precision.

Author declarations remain the same as in the original Article.

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