Vision impairments reduce cognitive test performance

To the Editor — Cognitive tests are critical for the reliable assessment of cognitive functioning in an aging population. However, even validated psychometric tests are subject to a variety of extraneous factors (for example, culture and language) that may affect performance. Regarding aging, one factor that stands out is reduced visual function. Indeed, performance on cognitive tests has been found to be negatively affected by vision impairment (for example, age-related macular degeneration or cataracts)[1–3]. When vision impairment is neglected during assessments, poor test scores may be falsely attributed to lower cognitive ability[2]. This oversight can have substantial ramifications for research on cognitive functioning and the accurate diagnosis of cognitive impairment.

In research, visual assessments by trained optometrists and ophthalmologists are often not feasible because of time and budget constraints. Yet it is estimated that 206 million people over the age of 50 have a moderate to severe vision impairment, and this number is expected to double by 2050 (ref. [4]). To further compound the issue, previous research estimates that between 20% and 50% of older individuals will have an undetected (and thus undeclared) visual impairment[5]. Moreover, elderly patients with age-related macular degeneration, cataracts, glaucoma and diabetic retinopathy have been found to be inaccurate when reporting on their own eye condition[6].

This Correspondence serves as a timely reminder to researchers focusing on aging and neurodegenerative disorders that precautionary measures need to be taken to account for individual differences in vision status at the time of testing. For example, researchers can check the extent to which their stimuli may be affected by a range of visual impairments. Mobile apps can now be used to overlay simulated visual impairments onto test materials[7] when piloting their stimuli. In addition, researchers can incorporate quick and simple screening tasks (for example, mobile Snellen or ETDRS charts) before cognitive assessment[8]. Participants unable to read to a minimum visual impairment line (for example, 6/18) with binocular vision and a corrective visual aid should be directed to seek formal testing and intervention before proceeding with cognitive tests.

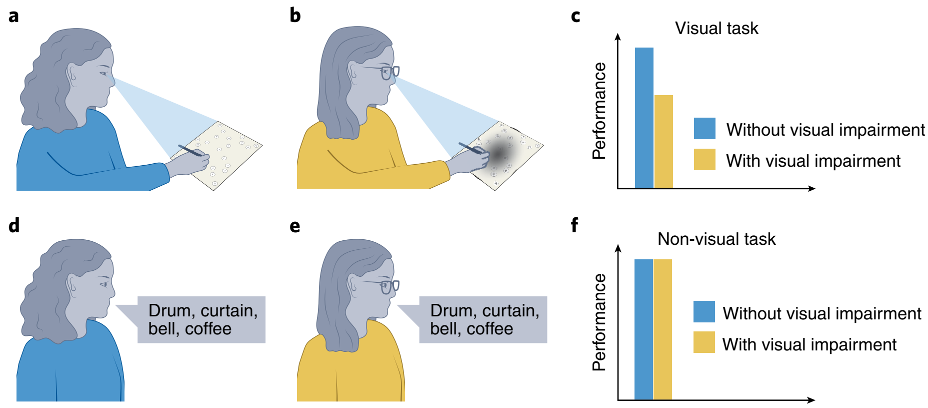

Fig. 1 | **Performance on visual and non-visual cognitive tasks can differ between people with and without a visual impairment, even if they have equivalent cognitive abilities. a–c**, A person without a visual impairment (**a**) may perform better than a person with a visual impairment (**b**) on the same visual-based cognitive assessment (for example, trail-making task) (**c**). **d–f**, By contrast, there may be no significant differences in performance between the person without a visual impairment (**d**) and the person with a visual impairment (**e**) on the same non-visual-based cognitive assessment (for example, Rey auditory verbal learning test) (**f**).

Researchers could also balance visual tests with other tests that do not depend on vision (for example, verbal tasks) as part of their assessment. Here, researchers should be particularly careful with time-sensitive measures that rely on visual input because they may provide inaccurate scores in terms of attention, processing speed and executive functioning in individuals who are visually impaired. If marked asymmetries are observed between visual and non-visual test performance[3], visual impairments may be isolated as the cause (Fig. 1). Finally, researchers should consider using variations of standardized tests (for example, blind MoCA or 6CIT) that substitute visuospatial aspects of the assessment with non-visual-based equivalents that provide a fairer evaluation of cognitive status[9]. While previous research has shown that these test adaptations have good specificity, more work is needed to improve their sensitivity for identifying cognitive impairment[10].

Implementing the above precautionary measures can enhance the reliability of research and diagnostic practices by allowing researchers and clinicians to better isolate the cognitive abilities of participants and patients. Critically, these precautionary measures require simple modifications to facilitate the fair and inclusive assessment of cognitive functioning. These modifications are in line with ethical codes of conduct (for example, those of the American Psychological Association) that call for alignment between tests and people's competence as a way of ensuring an accurate assessment of their abilities[11]. We hope this message will mobilize the scientific community to carefully consider the effect of visual impairment when working with aging populations. ❐

Anne Macnamara[1], Victor R. Schinazi[2,3], Celia Chen[4], Scott Coussens[1] and Tobias Loetscher[1] ✉

[1]*Cognitive Ageing & Impairment Neurosciences Laboratory, UniSA Justice & Society, University of South Australia, Adelaide, South Australia, Australia.* [2]*Department of Psychology, Faculty of Society & Design, Bond University, Gold Coast, Queensland, Australia.* [3]*Future Health Technologies, Singapore-ETH Centre, Campus for Research Excellence and Technological Enterprise (CREATE), Singapore, Singapore.* [4]*Department of Ophthalmology, Flinders Medical Centre, Flinders University, Adelaide, South Australia, Australia.*
✉*e-mail: tobias.loetscher@unisa.edu.au*

Published online: 11 November 2021
https://doi.org/10.1038/s43587-021-00135-2

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Author contributions

A.M., V.R.S. and T.L. conceptualized the correspondence. All authors contributed to and approved the final version the correspondence.

Competing interests

The authors declare no competing interests.