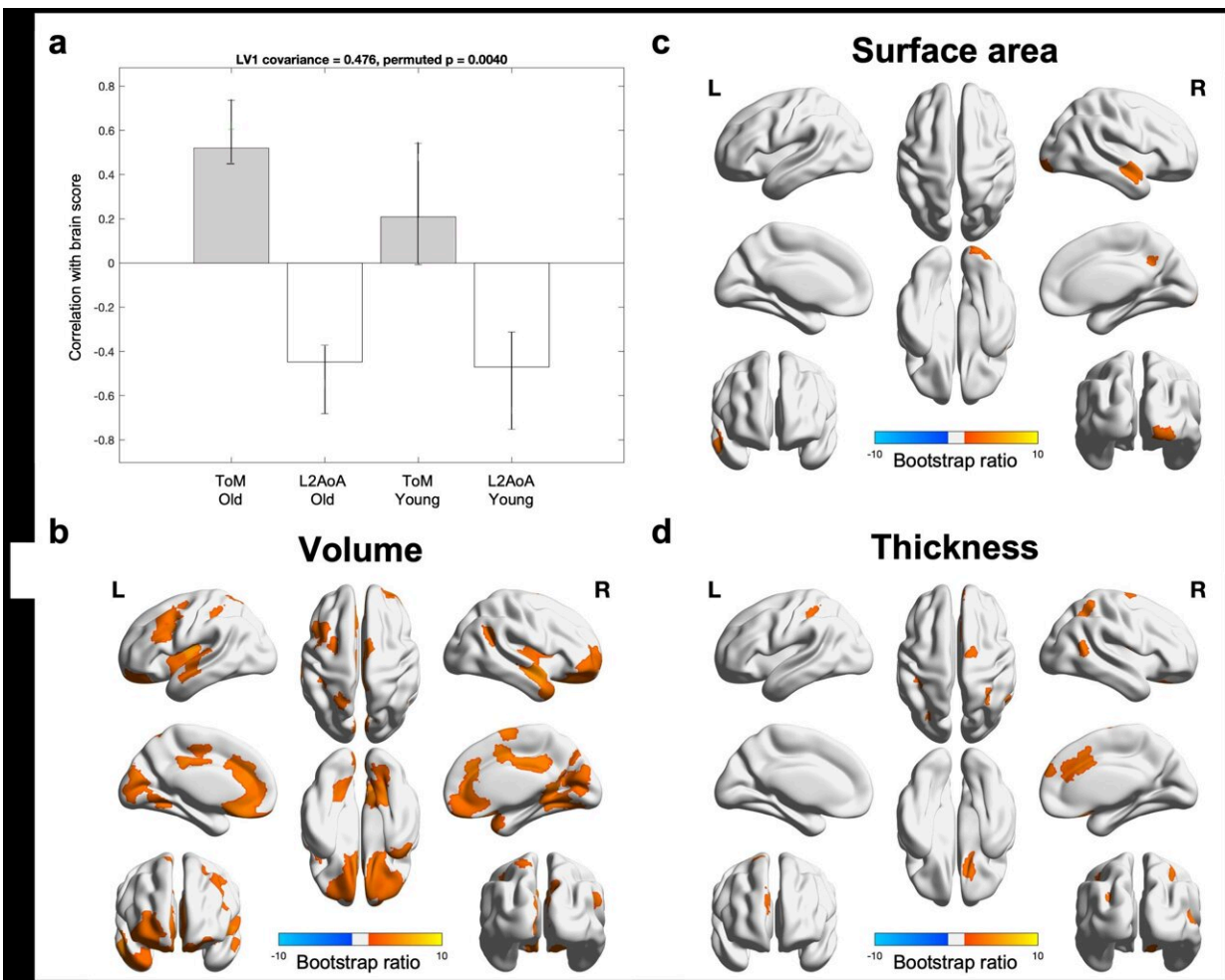


Learning a second language helps maintain a socially healthy brain in old age, finds study

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Higher gray matter volume, larger surface area, and greater cortical thickness were associated with earlier bilingual acquisition and better performance in theory of mind. Credit: *Scientific Reports* (2024). DOI: 10.1038/s41598-023-48710-4

Bilingualism is often associated with stronger executive function. SUTD and NUS scientists found that early bilingual acquisition can also protect cognitive processes that facilitate our social and emotional skills against normal age-related decline.

As a person ages, changes occur in both the body and the brain. Certain areas of the brain shrink and communication between neurons becomes less effective. "Such structural and functional changes result in an age-related decline in cognitive function, affecting language, processing speed, memory, and planning abilities," said Yow Wei Quin, Professor at the Singapore University of Technology and Design (SUTD).

Cognitive reserve, the brain's ability to adapt and compensate for decline or damage, allows an individual to use alternative pathways and brain regions to perform tasks. Naturally related to [cognitive reserve](#) is its neural basis, the brain reserve, which is defined by desirable neuroanatomical properties such as larger brain size and more neuronal synapses.

"These reserves highlight the brain's flexibility and resilience. An individual with greater reserves is likely to maintain good cognitive function in aging," Prof Yow added.

Among the multiple lifestyle factors that contribute to cognitive reserve is [bilingualism](#). The ability of bilinguals to constantly navigate between languages and communicate with people of different backgrounds could enhance their ability to interpret [social cues](#).

Moreover, knowing multiple languages is associated with stronger mental flexibility, attention control, and working memory—skills important for [social cognition](#) and [theory of mind](#), which is the ability to understand other people's behavior by attributing mental states like beliefs and emotions to them.

Previous studies on children and [young adults](#) have shown that bilingual language experience has a positive impact on theory of mind skills, but would this social cognitive enhancement persist in later life? This is the question that Prof Yow and her research fellow Dr. Li Xiaoqian set to answer.

In their paper, "Brain grey matter morphometry relates to onset age of bilingualism and theory of mind in young and [older adults](#)," [published](#) in *Scientific Reports*, the SUTD team and collaborators from National University of Singapore (NUS) showed that early bilingualism may protect theory of mind abilities against normal age-related declines.

There is evidence that learning and using a [second language](#) results in structural and functional changes in the bilingual brain. The research team hypothesized that acquiring a second language early may influence brain function and also create more efficient structural properties in the brain, which will provide reserves that fight against age-related social cognition decline.

What kind of changes in the brain would early bilingualism create that allows it to preserve social cognition, specifically theory of mind? Some researchers suggest that the association between bilingualism and social cognition manifests in brain areas involved in mental state inferences, while others suggest areas involved in language or cognitive control processes.

In this paper, Prof Yow and the team found that early bilingualism and better social cognitive performance in both young and old adults were associated with higher gray matter volume, greater cortical thickness, and larger surface area in the above-mentioned brain regions. Her study suggests that the earlier a second language is learned, the more desirable structural changes occur in the brain and the more cognitive reserve is established to protect social [cognitive processes](#) against age-related

decline.

These social cognitive abilities, particularly theory of mind, are crucial for understanding the thoughts and emotions of others. The current work provided new evidence of bilingualism having benefits beyond language skills and executive function. It supported the idea that bilingualism preserves social cognition in later life, fends off age-related decline, and contributes to healthier aging.

Co-first author of the paper, Dr. Li Xiaoqian from SUTD added, "Our findings highlight the potential social-cognitive benefits associated with acquiring a second language early in life." This could encourage parents and educators in supporting early bilingual education and lifelong bilingualism.

While age-related neurocognitive decline is natural and often manageable, delaying the process is important to enable individuals to live independently longer. Bilingualism can enrich and preserve social cognitive function, allowing a person to partake in activities they enjoy, maintain relationships, and perhaps even lessen the need for care in later life.

This study is part of a bigger project on the age-related psychological and neurological changes in social cognition. Functional magnetic resonance imaging (fMRI) data of individuals completing social-cognitive tasks was also collected alongside this study. Going forward, the research team plans to use the behavioral and neuroimaging data that they have gathered to further investigate the effect of bilingualism on social cognitive functioning.

More information: Xiaoqian Li et al, Brain gray matter morphometry

relates to onset age of bilingualism and theory of mind in young and older adults, *Scientific Reports* (2024). [DOI: 10.1038/s41598-023-48710-4](https://doi.org/10.1038/s41598-023-48710-4)

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