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The brains of older and younger adults react differently to errors

WHAT YOU NEED TO KNOW

Researchers can track brainwaves using Electroencephalography, or EEG technology. This study used EEG to track the brain's response to making an error in older and younger adults, and then compared the results. Older adults made more errors on a simulated driving task than younger adults, and older adults had a less intense brain reaction to those errors. These results suggest that cognitive decline in older adults may be partially linked to how the brain reacts to errors, leading to a decreased ability to respond to those errors.

WHAT IS THIS RESEARCH ABOUT?

As people age, they typically experience cognitive decline. One of the features of cognitive decline is decreased motor control skills, which can affect a number of activities, including operating a motor vehicle. Driving is a complex process that involves paying attention to your surroundings and constantly adjusting your behaviour (i.e., road signs, steering, speeding up/slowing down). It is possible that age-related decreases in motor control skills are related to changes in brainwaves (reactions in the brain). Researchers are able to track how the brain reacts to situations using EEG, and different events in the

environment cause different brainwaves. When a person makes a mistake, their brain gives off a specific brainwave in response – that brainwave is the focus of this research.

WHAT DID THE RESEARCHERS DO?

26 young adults and 26 older adults were brought into a lab environment and run through a simulated driving task (using a steering wheel and computer screen). While researchers tracked their brainwaves using EEG technology, participants operated a steering wheel in order to stay “in the road”. If the participants crashed into either side of the screen, it was considered an error. Researchers compared the results from the two groups of participants to look for differences in brainwaves.



EEG technology – 64 electrodes attached to a cap measure brain activity through electric currents. The brain communicates using electricity, and brainwaves are essentially electrical currents running through the brain.

Credit: UVic Photo Services



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WHAT DID THE RESEARCHERS FIND?

- Younger participants made fewer errors (crashes) overall than older participants.
- The brainwaves associated with both making an error and correcting for it were smaller in older adults than in younger adults.
 - In this case, smaller brainwaves mean that the brain is not reacting as strongly to the environment as it once could.

There are differences in the way the brain reacts to errors in older vs younger adults, with older adults showing smaller brainwaves in response to an error than younger adults. Overall, older adults made more mistakes on the driving task than younger adults. The authors of this study suggest this difference could be partially due to the difference in brainwaves that was observed.

HOW CAN YOU USE THIS RESEARCH?

This research highlights the science behind aging and cognitive decline. Brainwaves give us important insights into the inner workings of the human mind. If you are an older adult, someone who works with older adults, or have a loved one who is aging, this research might be of particular interest to you. Even if you are not directly connected to someone who is an older adult, being aware of the way the brain changes with age is a great way to increase tolerance and understanding of the experience of an older adult.

ABOUT THE RESEARCHERS

Dr. Francisco Colino is a postdoctoral research fellow in the Theoretical and Applied Neuroscience Laboratory at the University of Victoria, Canada.

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KEYWORDS

EEG, ERP, older adults, motor skills, error processing

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