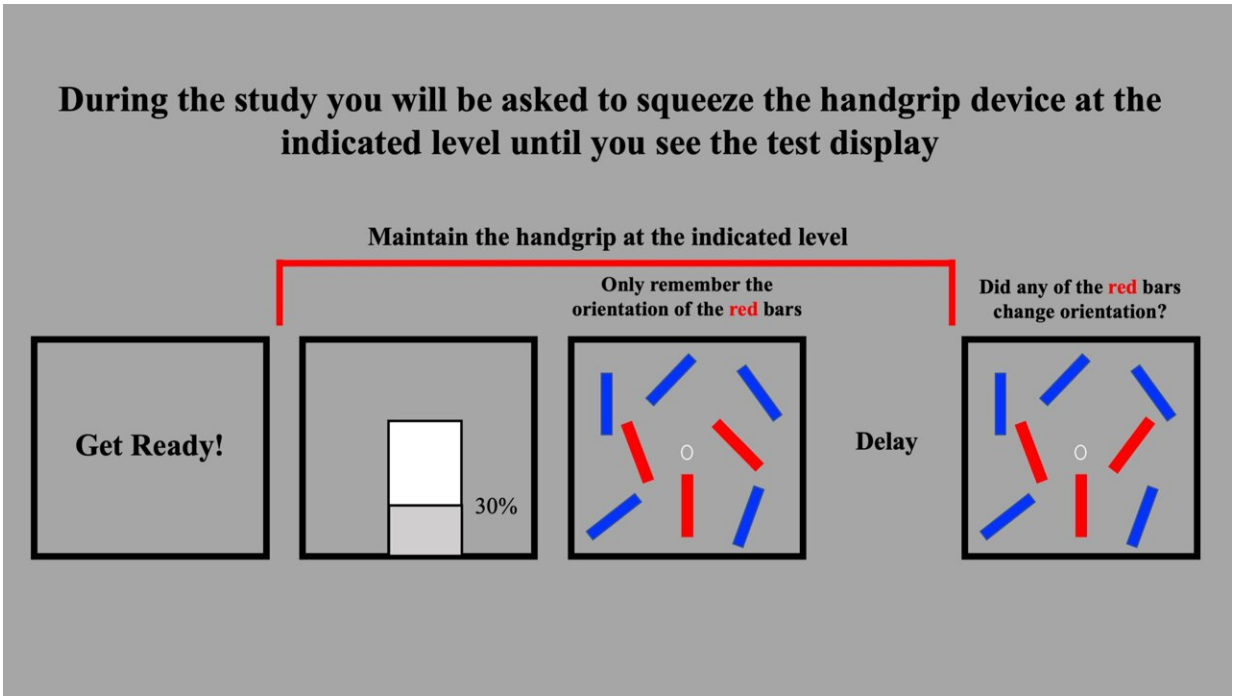
Medical Xpress

Older adults are more easily distracted, shows study

May 10 2023, by Iqbal Pittalwala



After collecting participants' initial maximum strength using the handgrip device, participants were asked to grip the handgrip device at low (5%) or high (30%) levels of their grip strength while they complete the working memory task. Participants were given a few seconds with online monitoring to adjust their grip squeeze at the indicated level and were asked to maintain the grip force throughout the trial until the test display asked them to release the device. In the memory display, they were shown 3 red bars alone or 3 red bars surrounded by blue bars and were asked to remember the orientation of only the red bars. At test, participants were instructed to release the hand grip device and indicate if any of the red bars changed orientation. Credit: Zhang lab, UC Riverside

While engaged in a physical task requiring effort, such as driving a car or carrying grocery bags, older adults are more likely than younger adults to be distracted by items irrelevant to the task at hand, reports a study from University of California, Riverside.

The study assessed the interaction between physical exertion and short-term memory performance when distractors were present or absent in younger and older adults.

"Action and cognition, which interact often in daily life, are sensitive to the effects of aging," said graduate student Lilian Azer, the first author of the research paper published in the journal *Psychology and Aging*.

"Our study found that in comparison to younger adults, older adults are less likely to ignore distractors in their surroundings when simultaneously engaging in a cognitive task and an effortful physical task. Ignoring task-irrelevant items declines with age and this decline is greater when simultaneously performing a physical task—a frequent occurrence in daily life."

According to Azer, the age-related differences may be amplified in situations where task demands are higher, such as having increased physical exertion or having more distractors.

The study tested what effects a simple physical action has on working memory and inhibitory control. Working memory, sometimes referred to as short-term memory, is a core cognitive process that maintains information while engaging in ongoing mental activities. Inhibitory control is the ability to ignore distracting information irrelevant to a task while focusing on task-relevant information.

The researchers recruited 19 older adults, aged 65-86 from local communities in Riverside, Calif., for the two-year study. Thirty-one

younger adults, all between 18-28 years old, were recruited from UC Riverside psychology undergraduate courses and given course credit.

All participants were asked to grip a hand dynamometer, a kind of handgrip device, at either 5% or 30% of their strength while they performed a short-term memory task. A centrally located visual gauge provided real-time feedback on the exerted grip force; nearby, a memory array consisted of small blue and red orientation bars. The participants' grip was the kind used when carrying a grocery bag, walking up a stairwell, or while driving.

Participants needed to focus on the red bars. The blue bars served as distractors—mimicking everyday distractions such as a vibrant billboard, a car honking, or an unrelated conversation. During the exercise with no distractors, they were shown three red bars momentarily and asked later to recall the bars' orientation. With distractors, they were shown five blue bars as well and instructed to only remember the orientation of the red bars.

"We found that under high physical effort older adults were less likely to both ignore the distracting information and focus on the task-relevant information," Azer said. "Our results suggest that older adults might have heightened distractibility."

Starting in 2030, older Americans will make up 21% of the population, up from 15% in 2018. By 2060, nearly 25% of Americans will be 65 years and older.

Weiwei Zhang, who led the study and in whose lab Azer works, stressed the importance of understanding age-related declines in physical and mental functions along with their interaction. He explained that as we grow older, we may experience a reduction in muscle mass and strength, and declines in key cognitive processes—worse short-term memory,

slower speed of processing information, and heightened distractibility—as a function of normal cognitive aging.

"It is important to understand that as we grow older, we may be more prone to distractors and this may be amplified during instances of simultaneous effortful physical action," said Zhang, an associate professor of psychology and a member of UCR's Aging Initiative. "Understanding how cognitive and physical actions interact can help us be more aware of how distracting information in our environment may impair our working memory."

The decline in our ability to ignore distractors as we get older is a result of normal cognitive aging. The prefrontal cortex, a part of the cerebral cortex that has been implicated in remote memory consolidation, plays a role, and is typically involved in working memory and processes involving inhibitory control.

Azer explained that effortful mental or physical activities are essential for our everyday functioning. For example, while driving, we tend to hold the steering wheel with about 30% of our maximum physical strength. When we carry heavy shopping bags, we tend to hold use about 20% of our maximum physical strength.

"As we engage in these physical activities, very often we simultaneously engage in cognitive tasks where distractors—a billboard or a car sales commercial on the radio—may be present," Azer said.

"Inhibitory control may suffer during these concurrent tasks, making it more difficult, especially for older adults, to ignore the distractors and focus on task-relevant information. Since it is rare that we perform a physical or cognitive task in complete isolation, it is important to minimize distractions. If this is not possible, we need to be aware that the effortful physical task may impair our ability to both perform a

working memory task and successfully ignore surrounding distracting information."

Next, the research team plans to further investigate the impact of effortful physical action on cognitive function.

"We would like to understand the role of arousal induced by physical effort and how this arousal can impact response time and inhibitory control," Azer said.

Azer and Zhang were joined in the study by Hyung-Bum Park of UCR and Weizhen Xie of the National Institute of Neurological Disorders and Stroke of the National Institutes of Health. Azer expects to graduate in June 2023 with a doctoral degree in psychology, focusing on cognition and cognitive neuroscience.

More information: Lilian Azer et al, Detrimental effects of effortful physical exertion on a working memory dual-task in older adults., *Psychology and Aging* (2023). DOI: 10.1037/pag0000746

Provided by University of California - Riverside