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 By SHARON BEGLEY


Studies on Dementia Often Confuse Causes With Consequences

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Studies have shown that people whose jobs pose minimal cognitive demands have a higher risk of Alzheimer's disease than people in mentally taxing jobs. Watching lots of television raises your risk, too. And older people who learn another language or take up music have a mental age younger than their years.

Can we conclude that brainy jobs prevent senility? That TV rots synapses? That cognitive challenges cause you to remain mentally spry?

More likely, people with brainy jobs have more brainpower and a higher "cognitive reserve" (backup processing capacity). That leaves them less vulnerable to dementia because pathological processes that attack a well-endowed brain take longer to produce dementia than attacks on a weaker one. Similarly, watching lots of TV may be a *consequence* of poor mental function, not a *cause*. And maybe only people whose brains are already firing on all cylinders can learn Urdu or the mandolin at age 65. If so, then mental spryness causes them to take up and stick with cognitive challenges, from crossword puzzles to chess, not vice versa.


When it comes to preventing the cognitive decline that comes with age, it's easy to confuse causes with effects. That was clear in emails I got challenging the gloomy conclusion of last week's column. I noted the lack of empirical support for the idea that mental exercise slows the rate at which memory, reasoning and other brain functions worsen with age.

Just because people who choose to be (and can be) mentally active stay sharper longer doesn't mean that mental exercise is the cause of that mental preservation, alas.

To nail down what is truly causal, researchers must randomly assign people with some activity, then compare them with similar people who didn't have that intervention. Studies like this have yielded evidence that training can boost some forms of memory, puzzle-solving, reaction speed and perception, as many new products claim. The Israeli developers of MindFit, which will be available in the U.S. in June, will soon unveil results of a one-year clinical trial, showing the program improves memory, attention, perception and other mental functions, as well as real-world driving ability. Nintendo's Brain Age and the Web-based My Brain Trainer likely improve the skills they train you on, too, say scientists not connected with the products.

"There is no doubt that older people can improve their performance on these tasks through training," says research psychologist Arthur Kramer of the University of Illinois, Urbana. "What we don't know is whether this transfers to real-world skills and cognitive function."

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The training effect fades unless you keep upping the challenge. Neuroscientist Michael Merzenich of the University of California, San Francisco, has shown that attention is a prerequisite for plasticity, or the brain rewiring that underlies the acquisition of skills. If something becomes routine -- crossword puzzles, chess -- its brain-boosting effects wane.

Ironically, interventions that obliquely target mental fitness seem most promising. In a 2003 review of 18 studies, Prof. Kramer and colleagues found that strength training and aerobics keep executive functions -- planning, remembering, multitasking -- sharp.

"Cardiovascular fitness training improves cognitive function in the elderly in as little as six months," he says. "It increases the volume of gray matter [neurons] and white matter [which connects neurons] in regions that handle executive functions." It also improves the efficiency of networks that underlie some forms of memory and attention.

Another oblique intervention targets the stereotype that old age is one long mental slide. "Some problems the elderly experience with fluid intelligence -- problem solving and information processing -- come from how they think about getting old," says Bert Hayslip of the University of North Texas, Denton.

An action called "catastrophizing" affects how much effort people put into a mental task, and how anxious it makes them. Panicking when you forget a name floods the brain with cortisol, which is brain poison (especially to memory areas). In his studies, people who received cognitive-behavior therapy to avert catastrophizing had sharper fluid intelligence than a control group even three years later.

An intriguing program from Posit Science, in San Francisco, also targets cognitive decline indirectly. Old brains receive and store information in a weak and degraded form. Brain-chemical systems are also diminished. That causes the brain to process information sluggishly and incorrectly, which hurts thinking and remembering.

Based on decades of animal studies, Prof. Merzenich helped develop listening and language exercises to drive brain plasticity, improve the strength and fidelity of encoded information and rev up neurotransmitters. In a study presented last weekend, Posit reported that 95 seniors (average age 80) who used the program showed significant improvement on memory and cognition.

"Aging used to be seen as causing irreparable brain injury," says Michael Marsiske of the University of Florida. "But older adults can be made to perform better on almost anything."

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