Intellectual Vitality

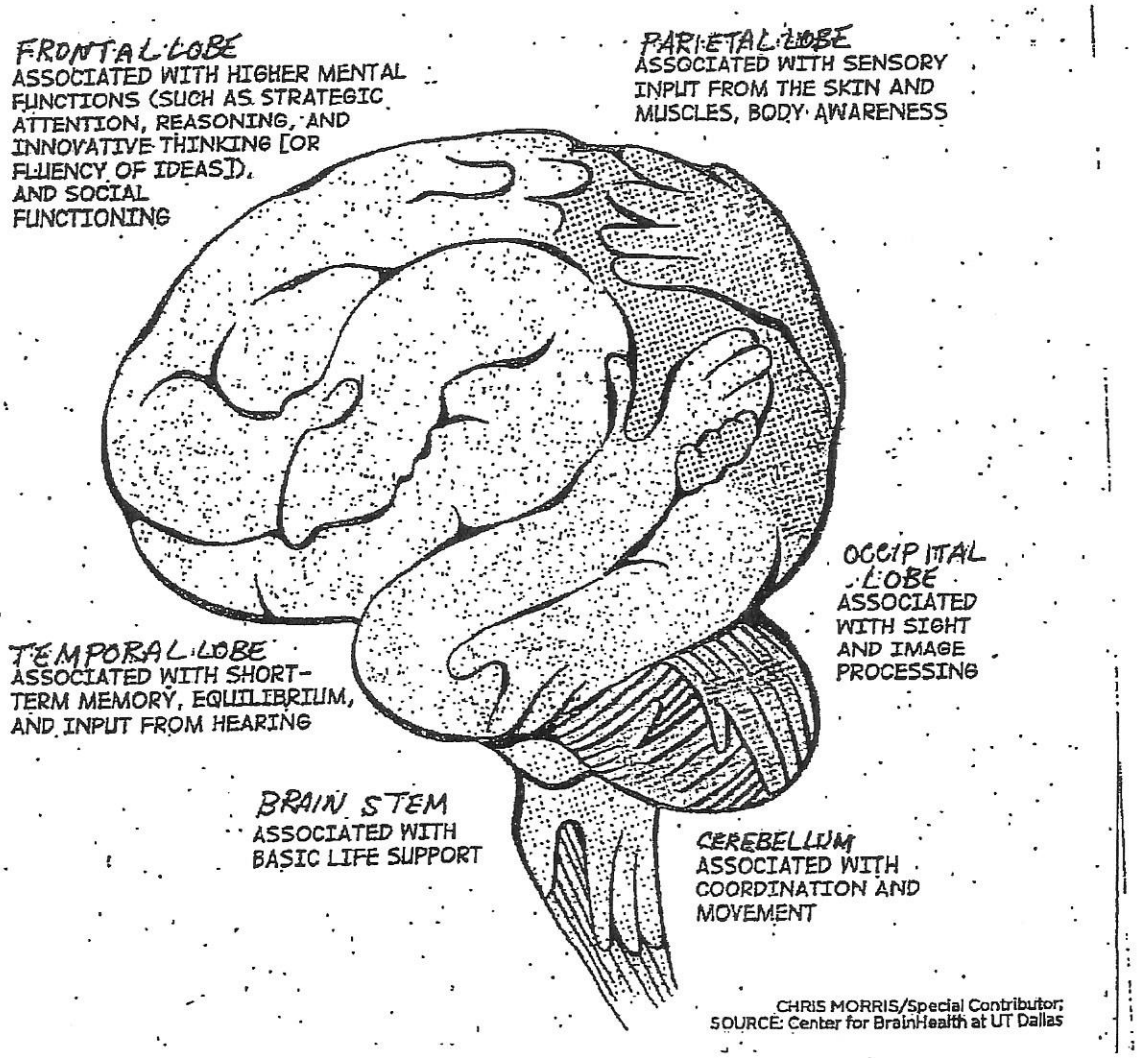
- Being able to maintain your intellect in the face of obstacles.
- Being open to new ideas and ways of thinking.
- Feeling that you can use your mind in an active way.
- Having self-confidence in and enthusiasm about your skills.
- Being able to use your mind to cope with everyday life and foster productive relationships with others.
- Feeling intellectually alive and healthy.

re: Jessie aging pattern
WAIS

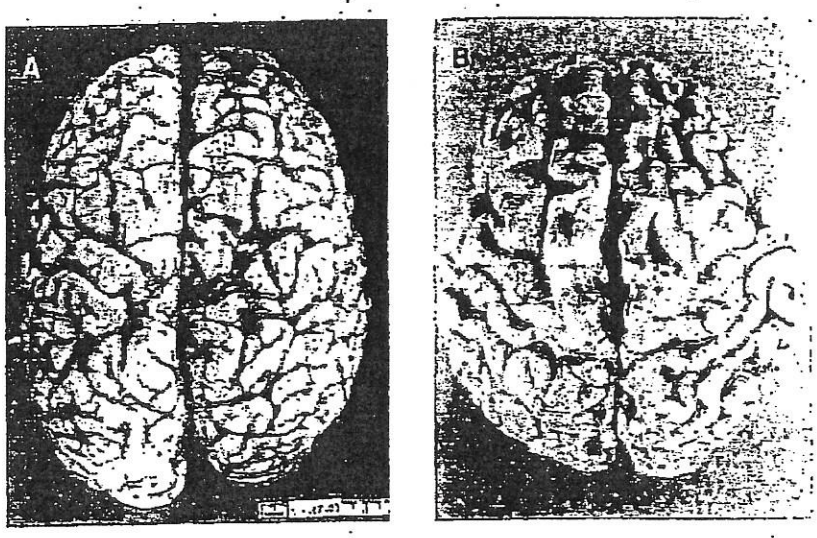
WAIS-R SUBTESTS

Scale	Sample Items
Verbal tests	
General information	1. How many wings does a bird have? 2. How many nickels make a dime? 3. What is steam made of? 4. Who wrote "Tom Sawyer"?
General comprehension	1. What should you do if you see someone forget his book when he lea a restaurant? 2. Why is copper often used in electrical wires?
Arithmetic	1. Sam had three pieces of candy and Joe gave him four more. How ma pieces of candy did Sam have altogether? 2. Three women divide eighteen golf balls equally among themselves. How many golf balls did each person receive?
Similarities	1. In what way are a lion and a tiger alike? 2. In what way are a circle and a triangle alike?
Vocabulary	This test consists simply of asking, "What is a _____?" or "What does _____ mean?" The words cover a wide range o difficulty.
Performance tests	In addition to verbal tasks of the kinds illustrated above, there are a number of performance tasks involving the use of blocks, cut-out figures, paper and pencil puzzles, etc.

Source: Adapted from Wechsler Adult Intelligence Scale—Revised. Copyright 1981, 1955 by The Psychological Corporation. Reproduced by p mission. All rights reserved.



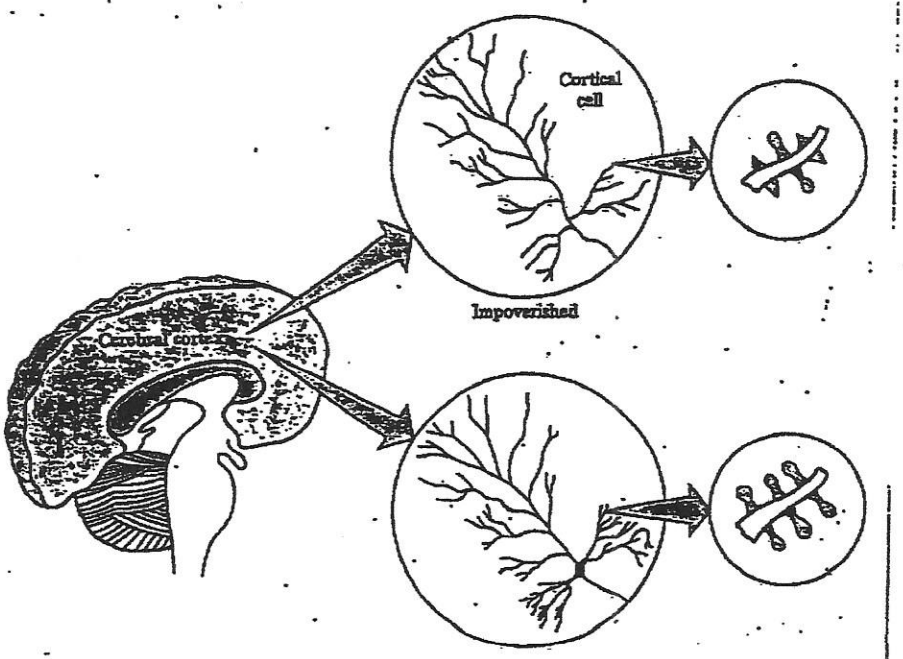
CHRIS MORRIS/Special Contributor;
SOURCE: Center for BrainHealth at UT Dallas



Relative to a normal aged brain (A), the brains of persons diagnosed with Alzheimer's disease (B) are disproportionately small and have experienced alternations in both the fissures and sulci of the cerebral cortex.

NORMAL
VS
ABNORMAL aging

NEURONAL growth + stimulation



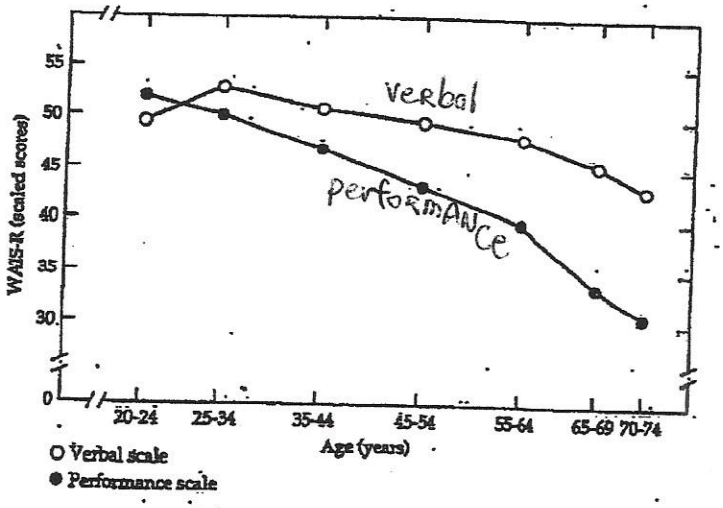


Figure 6.5 WAIS-R Verbal and Performance scores as a function of age. Data were obtained from Table 20 of the WAIS-R Manual (Wechsler, 1981, pp. 97–109) by culling sum of scaled scores of IQs of 100. (The Verbal scaled scores were multiplied by 5/6 to develop a common base with the Performance scaled scores.)

CLASSIC aging pattern

fluid + crystallized ability

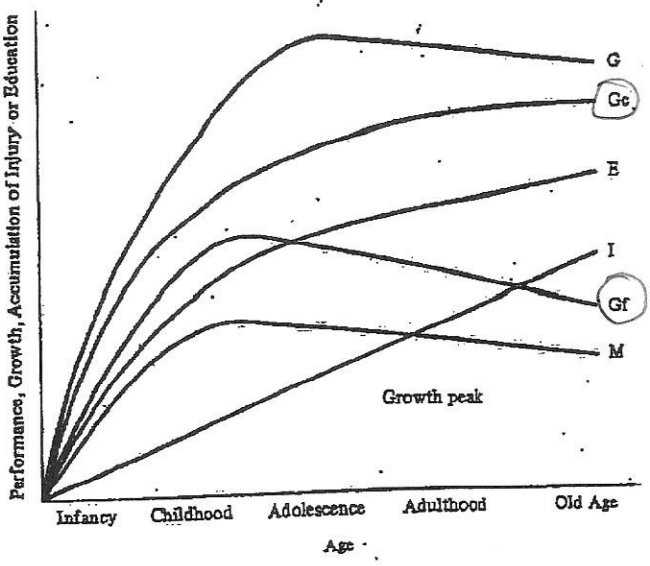


Figure 6.3 Gf-Gc curves across age. Development of fluid intelligence (Gf) and crystallized intelligence (Gc) in relation to maturational growth and decline of neural structures (M), accumulation of injury to neural structures (I), accumulation of educational exposures (E), and overall ability (G). *Source:* Adapted from J. Horn. (1970). Organization of data on life-span development of human abilities. In L. Goulet & P.B. Baltes (Eds.), *Life-span developmental psychology: Research and theory* (p. 465). New York: Academic Press. Reprinted by permission of the author.

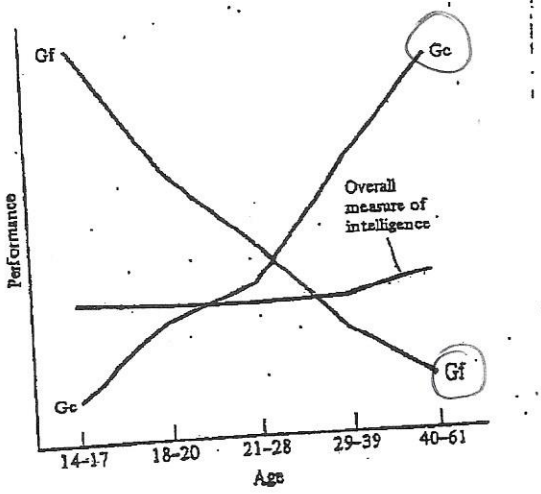


Figure 6.7 Age curves for Gc and Gf versus overall intelligence. *Source:* J. Horn. (1970). Organization of data on life-span development of human abilities. In L. Goulet and P. Baltes (Eds.), *Life-span developmental psychology: Research and theory* (p. 463). New York: Academic Press. Reprinted by permission of the author.

PMA- age differences

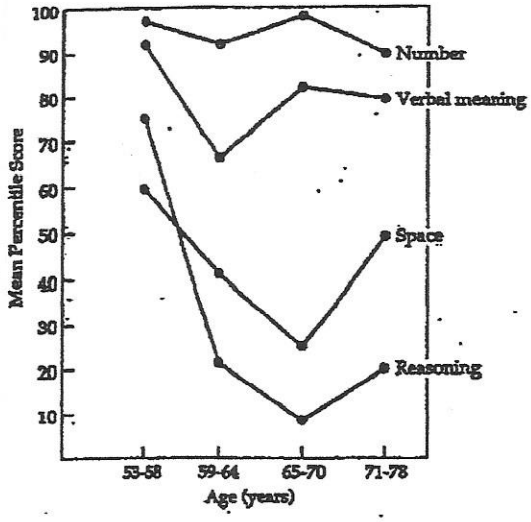


Figure 6.6 Age differences in scores on the factor components of the Primary Mental Abilities (PMA) Test. (Adapted from Schaie, Rosenthal, & Perlman, 1953, Figure 2. Copyright © 1953 by the Gerontological Society of America: Adapted by permission.)

PMA- age changes

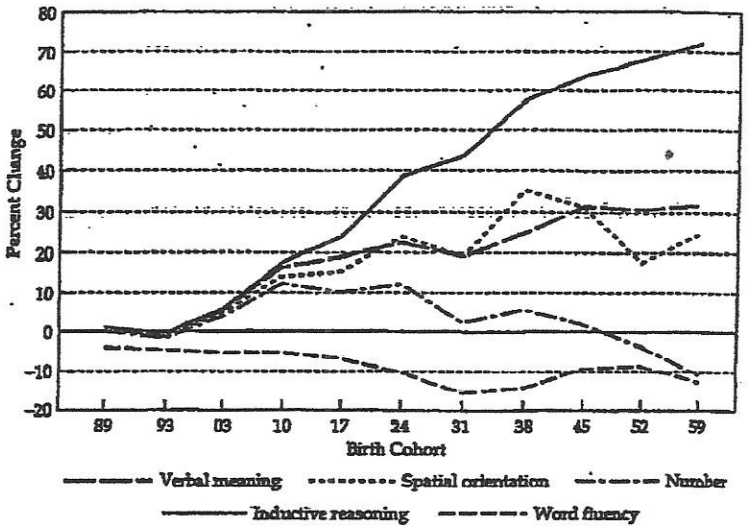


Figure 6.7 Cumulative cohort differences from 1889 base cohort for the mental abil
Source: Schaie (1990). Cohort differences in mental abilities. *Late life potential* (p. 48).
ontological Society of America.

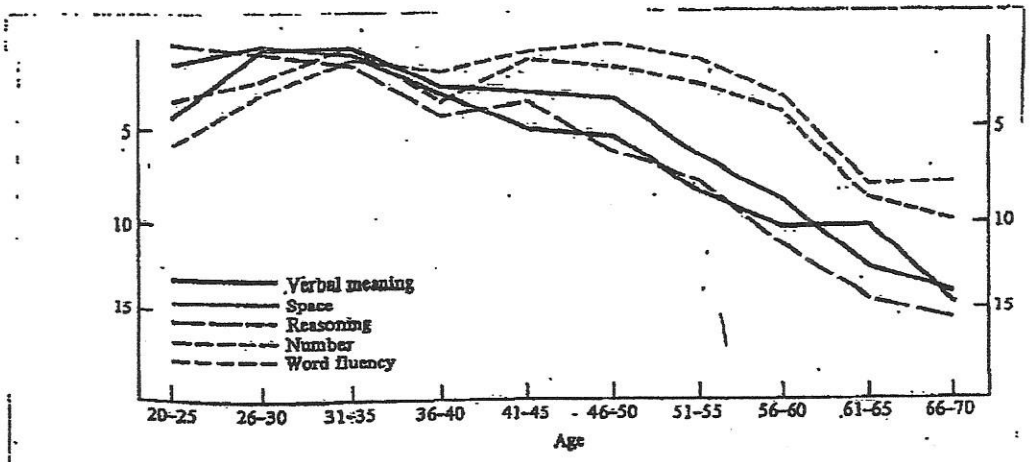


Figure 6.6 PMA curves across age: mean decrement in the primary mental abilities from mean peak levels in standard scores. *Source:* Adapted from K.W. Schaie. (1958). Rigidity-flexibility and intelligence: A cross-sectional study of the adult life span from 20–70. *Psychological Monographs, 72,* No. 9 (Whole No. 462), 15.

PMA - cohort effects

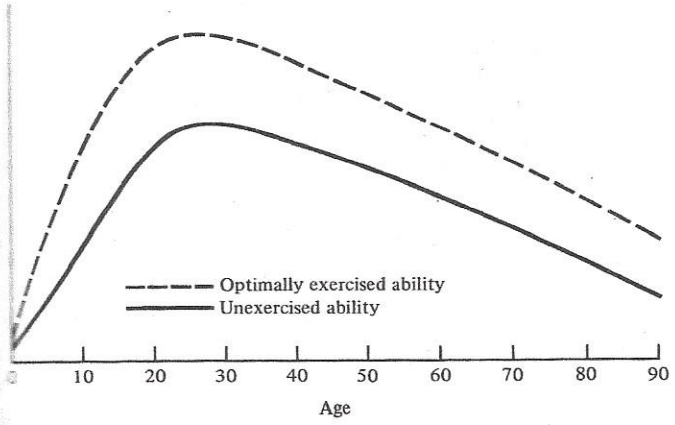


Figure 6.9 Denney's curves for unexercised and exercised abilities. Developmental functions of unexercised and optimally exercised cognitive abilities. *Source:* Nancy Wadsworth Denney, "Aging and Cognitive changes," in *Handbook of developmental psychology,* B. Wolman, ed., © 1982, p. 819. Reprinted by permission of Prentice-Hall, Inc., Englewood Cliffs, New Jersey.

exercised skills fare better with age

Does an Engaged Lifestyle Help Us Age Better Mentally?

Some persons certainly do age better than do others, intellectually speaking. We all know people who despite being in their 80s and 90s, are still "sharp as a tack." Why might this be? Does it have anything to do with what we do with our daily lives? Are we stimulated mentally? Do we watch TV or solve crossword puzzles? Do we read books or read the comics? Do we challenge ourselves mentally by doing challenging, difficult, and stimulating things?

Recently, there has been much interest in the effects, if any, of leading an **engaged lifestyle** on intellectual and cognitive aging, and even the effects of such lifestyles on dementia (see Chapter 10). Do such lifestyles help? Many people believe so, while many do not. Answers to this question depend upon who one asks.

For example, in the **Nun Study**, longitudinal work by Snowden (2001) suggests that nuns whose linguistic skills (indicating that they were well read and curious) were better early in life seemed to be less likely to develop Alzheimer's disease, and if they did so, they seemed to be less severely affected. McCormick and his associates (2006) found that regular (and varied) physical exercise protected persons against Alzheimer's disease. Kleigel, Zimprich, and Rott (2004) stress the importance of early education and lifelong intellectual engagement on cognitive functioning among centenarians. Newson and Kemps (2005) based upon cross-sectional and longitudinal studies also found lifestyle activities to promote cognitive growth in later life. A review of cognitive and physical exercise by Hogan (2005) suggests that each can lead to **multisystem resilience** (cardiovascular, physical, and musculoskelatal) in older persons that can promote better everyday functioning, while the review by Hayslip and Maiden (2005) found that the effects of an engaged lifestyle are both positive in some studies and minimal in others. Still others (Salthouse, 2006) conclude that there is no conclusive evidence for the positive impact of an engaged lifestyle on one's intellectual and thinking skills later in life; neither the rate of cognitive decline nor its prevention seems to be affected by engaging in stimulating everyday activities.

The key factor to consider in answering this question is that engaged lifestyles and rates of decline or levels of performance in later life may be **correlated,** but not necessarily **causally related**. Their relationship is explained by a **third factor**, being it physical and mental health, how often one practices the skills that are crucial to everyday functioning and decision making, or how highly educated one is. An importance piece of this puzzle may be the **personality** of the older person. If one is intellectually curious, values stimulating conversations with others, enjoys mental challenges (e.g., Sudoku, crossword puzzles, anagrams) and learning new things, he or she will create a lifestyle that is stimulating. It could also be that persons who live engaged lifestyles have more **cognitive reserve**, and so while they do lose some of their abilities as they age, they appear to function better because they have this "cushion" to fall back on. The problem of whether an engaged lifestyle is helpful should challenge us to make the most of our intellectual lives, be it in elementary school, college, in the world or work, or later in life. Indeed, there may be some truth in the "use it or lose it" philosophy of cognitive aging!

Build Brain Function

A new UTD program assesses participants and works out the mind like a muscle

This year more than ever, finding ways to keep healthy, both mentally and physically, has been heavy on our minds. But how do we take care of our minds when we are so busy focusing on our bodies? The University of Texas at Dallas BrainHealth Project has a different take on this issue, with a recently published study aiming to track and strengthen cognitive function.

Sandra Chapman, a cognitive neuroscientist, has created an assessment called the BrainHealth Index designed to measure brain function. Rather than focusing on mental illnesses or brain injuries, the idea is to track brain function in healthy people to help them keep their brains in shape and to understand cognitive changes over time. Like targeting a specific muscle during a workout, the scores show what sections of the brain function you should be working on to increase your brain health.

What Dr. Kenneth Cooper has done for heart health and prevention, Chapman intends to do for the brain.

"I have had to get physicals all over the nation, and the amount of time that [doctors] spend kind of below the neck versus above the neck is surprisingly disappointing," said Tom Leppert, co-leader of The BrainHealth Institute and former mayor of Dallas. "People understand cholesterol and take medication for those sorts of things, but yet on the brain side, it has lagged, unfortunately, and we don't have those same standards and benchmarks just to be able to target issues and assess how you do in the rest of the parts of your body."

This measurement is based on an initial assessment in which the participant answers questions about brain function. From there, an index of strengths and weaknesses is put together, giving the participant a score, which is used as a baseline to determine which areas need improvement.

From there, each participant is given a coach who assigns training for the participant to improve weaker areas of brain function. Like working out a muscle in a gym, implementing these exercises into everyday routine strengthens those problem areas which, in turn, benefits overall brain function, according to the project.

"Think of brain health not just in terms of the medical perspective but in terms of the performance perspective to make it stronger and make it work better for you," Lori Cook, director of clinical research at UTD said. "Earlier is better when it comes to building resilience."

A pilot study of this process published in March has shown increases in scores over a period as short as three months. While people typically worry about brain function as they get older and problems begin to arise, BrainHealth scientists and coaches encourage people to start thinking about their brain earlier.

Leppert isn't the only big Texas name on the project's leadership team. William McRaven, former Navy SEAL, retired four-star admiral and former chancellor of the University of Texas System, is a spokesperson for the project.

The project has just completed its pilot study, and Chapman has already begun a subsequent 10-year study aiming to include a much larger pool of participants.

Participants can sign up for the 10-year study at brainhealth.utdallas.edu. While the project is still in study phases, the promising results are worth celebrating as research continues in our own backyard.

THE GENIUS SECTION

10 Pages TO SHARPEN *Your Mind*

UNFREEZE YOUR BRAIN

Can you use these items to attach the candle to the wall and light it? Step one is to jettison tired thinking patterns, which derail even the most intelligent among us.

BY *Leonard Mlodinow*

FROM THE BOOK ELASTIC

PHOTOGRAPHS BY *Matthew Cohen*

In life, once on a path, we tend to follow it, for better or worse. What's sad is that even if it's the latter, we often accept it anyway because we are so accustomed to the way things are that we don't even recognize that they could be different.

This is a phenomenon psychologists call functional fixedness. This classic experiment will give you an idea of how it works—and a sense of whether you may have fallen into the same trap: People are given a box of tacks and some matches and asked to find a way to attach a candle to a wall so that it burns properly.

Typically, the subjects try tacking the candle to the wall or lighting it to affix it with melted wax. The psychologists had, of course, arranged it so that neither of these obvious approaches would work. The tacks are too short, and the paraffin doesn't bind to the wall. So how can you accomplish the task?

The successful technique is to use the tack box as a candleholder. You empty it, tack it to the wall, and stand the candle inside it.

To think of that, you have to look beyond the box's usual role as a receptacle just for tacks and reimagine it serving an entirely new purpose. That is difficult because we all suffer—to one degree or another—from functional fixedness.

The inability to think in new ways affects people in every corner of society. The political theorist Hannah Arendt coined the phrase *frozen thoughts* to describe deeply held ideas that we no longer question but should. In Arendt's eyes, the complacent reliance on such accepted "truths" also made people blind to ideas that didn't fit their worldview, even when there was ample evidence for them. Frozen thinking has nothing to do with intelligence, she said. "It can be found in highly intelligent people."

Arendt was particularly interested in the origins of evil, and she considered critical thinking to be a moral

THE INABILITY TO THINK IN NEW WAYS AFFECTS ALL CORNERS OF SOCIETY.

imperative—in its absence, a society could go the way of Nazi Germany.

Another context in which frozen thinking can turn truly dangerous is medicine. If you land in the hospital, it's natural to want to be treated by the most experienced physicians on staff. But according to a 2014 study in the *Journal of the American Medical Association* (*JAMA*), you'd be better off being treated by the relative novices.

The study examined nearly ten years of data involving tens of thousands of hospital admissions and found that the 30-day mortality rate among high-risk patients with acute heart conditions was a third lower when the

top doctors were away at conferences.

The *JAMA* study didn't pinpoint the reasons for the decreased death rate, but the authors explained that most errors made by doctors are connected to a tendency to form opinions quickly, based on experience. In cases that are not routine, the expert doctors may miss important aspects of the problem that are not consistent with their initial analysis. As a result, although junior doctors may be slower and less confident in treating run-of-the-mill cases, they can be more open-minded with unusual cases.

FORTUNATELY, PSYCHOLOGISTS have found that anyone can unfreeze his or her thinking. One of the most effective ways is to introduce a little discord to one's intellectual interactions.

Consider a study performed about half a century ago. The researcher showed two groups of female volunteers a sequence of blue slides. In both groups, he asked each individual to state the color of each slide. In the experimental group, he had planted some actors who called the color green rather than blue. Whom were they fooling? Nobody. The experimental subjects ignored the deviant responses. When their turns came, most of them answered blue, just as the control group had.

Then the subjects were asked to classify a series of paint chips as either green or blue, even though their color lay between those two pure colors. Amazingly, the people who'd been in the experimental group identified many chips as green while those from the control group called the same ones blue. Even though no one in the experimental group had been convinced by the actors before, their exposure to the earlier misidentification had shifted their judgment and made them more open to seeing a color as green.

Other experiments have shown that dissent can not only sway us with regard to the issue at hand; it can also thaw frozen thinking in general, even in contexts unrelated to the original discussion. What this all means is that, as difficult as it can sometimes be, talking to people who disagree with you is good for your brain. So if you hate conspiracy theories and run into someone who believes that we faked the moon landing, don't walk away. Have tea with him or her. It can broaden your thinking in countless ways. ■

HOW TO THINK OUTSIDE THE BOX

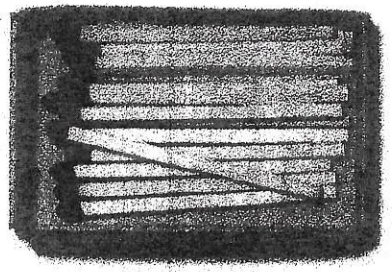
In addition to being open to dissenting opinions, here are some techniques that could help broaden the way you think

1 Change Environments
A disruption in your everyday life may provide the force needed to alter the direction of your thinking. For some people, small changes might help (reorganizing your desk or taking a new route to work), whereas for others, more upheaval (a new job or a divorce) is required.

2 Look as if You've Never Seen
A Zen Buddhist concept for approaching even routine situations as if you were encountering them for the first time, "beginner's mind" allows you to remain open to new experiences despite any expertise you may have. For instance, when you brush your teeth, take a moment to look at the toothbrush as if you've never laid eyes on such an object and notice its color and shape. Think about the flavor of the toothpaste and notice how your mouth feels as you move the brush back and forth.

3 Vive la Différence
The mere presence of individuals from different backgrounds with different points of view in your everyday life creates an atmosphere in which people can better respond to change.

4 Shift into Positivity
Unlike negative emotions that trigger specific reactions (e.g., fear propels us to flee), positive emotions prompt us to broaden our attention, explore our environment, and open ourselves to absorbing information. Take a few moments to think about the things in your life that are going well and for which you are grateful; this will automatically brighten your mood—and free your brain.



TALKING TO PEOPLE WHO DISAGREE WITH YOU IS GOOD FOR YOUR BRAIN.

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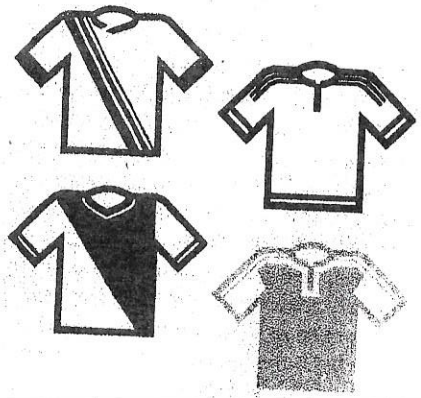
Jim Woods, VP, Magazine Planning

BRAIN GAMES

Win or Lose

DIFFICULT The Reds, the Grays, the Blues, and the Blacks have a round-robin tournament wherein each team plays each other team once, for a total of six games. The Blacks won more games than the Blues, and the Grays lost more games than the Blues. The Reds tied the Blacks, the only tie in the tournament (a tie counts as neither a win nor a loss). Who won the game of the Reds versus the Blues?



WIN OR LOSE: DARREN RIGBY

Word Sudoku

MEDIUM Complete the grid so that each row, each column, and each three-by-three frame contains the nine letters from the black box below. A hidden nine-letter word is in the diagonal from top left to bottom right (it may contain repeated letters).

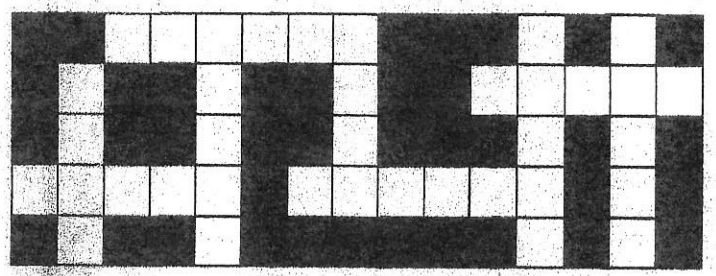
U		D		P	B		N	L
B		E	U			D		P
	G			D	E		U	
G						N		U
N		H	B	U				G
	U	L	H	N	G	P		E
	L			B			P	
H			P		N	U		B
P	B	N	E		U		L	D

BDEGHLNPU

For more Brain Games, go to GAMES.RD.COM.

Quick Crossword

EASY Place the words listed below in the crossword grid.

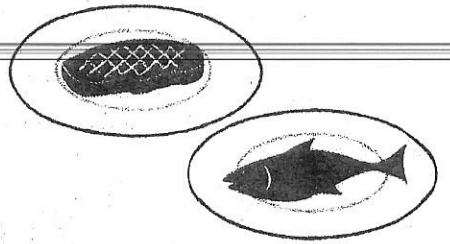


DUBLIN TOKYO DENVER CAIRO PARIS LILLE LYON NICE BOGOR

JAKE LOVES STEAK: SAMANTHA RIDEOUT

100-Word Mystery

MEDIUM Lois and Helen, widowed sisters, lived together out in the country. Their habits never changed: up at dawn, breakfast, some housework and gardening until lunch. In the afternoon, Helen napped while Lois watched her shows—Helen never watched TV. Then Helen would clean the vegetables for dinner and Lois would cook. In the evening, they'd read before bed. One night before they turned in, a storm knocked out the power. Everything was pitch-black, and Lois began to panic. "What should we do?" she cried. Helen just smiled and kept reading. Why did Helen stay calm while her sister did not?



Jake Loves Steak; Trish Loves Fish

MEDIUM Jacob enjoys steak so much that the probability that he'll have it for dinner on any given evening is one in three. The favorite dish of his wife, Patricia, is fresh fish. The probability that she'll have it for dinner on any given evening is one in two. Because Jacob and Patricia always dine together, they'll never have steak and fish on the same night. On average, how many times in a 30-day month will they be having either steak or fish?

For answers, turn to THE NEXT PAGE.

ADVERTISEMENT

LEAVE YOUR COMFORT ZONE

When it comes to finding a new career, sticking to what we know may seem like the safest bet. But slipping out of our comfort zones brings the most positive results. As a master of personal reinvention, Pamela Mitchell, founder and CEO of The Reinvention Institute, takes us through the process step by step.

PAMELA MITCHELL

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2

TRY A MINI-REINVENTION "Even making small changes can be challenging. I updated my makeup after 20 years, and it was shockingly difficult. You can also try a new clothing style. It will be uncomfortable, but you're coaxing your brain to move toward major changes."

3

WORK OUT IN A NEW WAY "There's almost no place where our habits are more ingrained than at the gym. So try something new. If you're used to the treadmill, go for a run outside; if you usually lift weights, try yoga."

4

BE NIMBLE, BE QUICK "I enrolled in an improv class. Having to think on your feet in front of other people is an incredible way to train your brain to accept — and eventually even look forward to — the magic that happens when you enter something new."

It took Pamela Mitchell years to refine her reinvention expertise to help you find your perfect life, but you can easily master the way you bank in minutes.

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'BRAIN GAMES': HELPFUL TOOL OR FALSE F

Federal Trade Commission v. Lumos Labs Inc. addresses c

BY JENNIFER K. ROBBENNOLT, JD, PhD, UNIVERSITY OF ILLINOIS

In January 2016, Lumos Labs, the creators of the Lumosity "brain training" games, agreed to settle charges related to deceptive advertising brought against them by the U.S. Federal Trade Commission (FTC). According to the company's literature, Lumosity offers a "personalized brain training program" and related assessment measures, as well as an assortment of games "targeting cognitive abilities such as memory, attention, speed, flexibility and problem-solving." Subscriptions to Lumosity range from a monthly fee of $14.95 to a lifetime subscription of $299.95.

In its complaint, the FTC charged that the company deceptively claimed that scientific research demonstrated that using Lumosity "will improve performance on everyday tasks; will improve school, work, and athletic performance; will delay age-related decline in memory and protect against other age-related conditions such as mild cognitive impairment, dementia, and Alzheimer's disease; and will reduce cognitive impairment associated with the side effects of chemotherapy, post-traumatic stress disorder, traumatic brain injury, attention-deficit hyperactivity disorder, Turner syndrome, stroke, and other health conditions." In addition, the FTC charged that the company presented consumer testimonials that were obtained through contests that offered substantial prizes, but that the company did not disclose to consumers how these testimonials were obtained.

Settlement reached. Lumos Labs did not admit or deny the FTC's allegations, but the company agreed to the terms of the settlement. In particular, the settlement prohibits the company from making claims about Lumosity's effects on performance, memory decline or cognitive impairment, unless the claim is "non-misleading" and based on "competent and reliable scientific evidence."

The company was also required to pay $2 million, to notify subscribers of the settlement, to provide

THE VERDICT

There is not enough research to show that brain games lead to the cognitive gains claimed by some companies.

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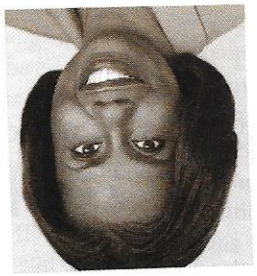
JESSICA HENDERSON DANIEL, PhD



the extent to which the effects persist, and the mechanisms underlying any improvement will help to further our understanding of cognitive health and cognitive decline.

At the same time, psychologists have explored other ways to improve brain health—such as physical exercise. As one group of psychologists advises, consumers ought to "keep in mind opportunity costs. Time spent playing the games is time not spent reading, socializing, gardening, exercising, or engaging in many other activities that may benefit cognitive and physical health of older adults."

As the research develops, companies such as Lumos Labs will need to work to make sure that claims about their products are based on the available science. In this case, the FTC concluded that the claims outstripped the science. As noted by Jessica Rich, director of the FTC's Bureau of Consumer Protection, "Lumosity preyed on consumers' fears about age-related cognitive decline, suggesting their games could stave off memory loss, dementia and even Alzheimer's disease. But Lumosity simply did not have the science to back up its ads." ■

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LEARN HOW ON PAGE 6

BRAIN TRAINING HAS BLOSSOMED FROM A $210 MILLION BUSINESS IN 2005 TO ONE WORTH $1.3 BILLION IN 2013

they got what they bargained for, according to a SharpBrains survey.

About 10% of people, including Cindy Siegal, say they feel cheated by the claims made by brain-training companies. Siegal, who lives in Montclair, N.J., spent $10,000 on a brain-training program called LearningRx to help her teenage daughter Brianna, who has memory problems and dyslexia.

After almost a year, Brianna was still failing her classes, her teachers hadn't noticed improvement, and she felt more frustrated and discouraged than ever.

Tanya Mitchell, vice president of research and development for LearningRx, contends that Brianna's case is unusual. She says most students who participate in its programs improve about 15 or 20 percentile points on the standardized tests given after 90 hours of training.

The Federal Trade Commission (FTC) regulates advertising claims that companies make about their products. When asked specifically about its regulation of brain-training products, an FTC spokesperson said that the commission does not speculate about whether it will take action in a particular area.

A spokesperson for the Food and Drug Administration (FDA) says brain games that pose a low risk, such as those intended to help improve cognition, "would likely fall under the agency's enforcement discretion." Higher-risk games—those intended to diagnose or treat a specific disease—"may require FDA oversight to assure that such specific therapies and diagnosis are safe and effective." She adds, "We encourage companies who have questions to come talk with us."

Finn says, "What's unfortunate is that there might be something that has value, but we have to...understand what it is. We want to be careful and do the good science so you can say, 'OK, this is how it works and this is who it helps.'"

The problem is that much of the "science" touted by companies that sell brain-training games is weak or biased. Companies often conduct their own studies to test their products, so there's a profit motive to find positive results. Or the studies have too few participants to be statistically valid.

WHAT IS KNOWN

In one of the largest studies to date on brain training, researchers at Cambridge University in 2010 assigned more than 11,000 people to one of two brain-training regimens or to a control group that was just asked to answer challenging questions on a computer. The brain games were designed to mirror the kinds of exercises available through companies such as Lumosity, CogniFit, and Fit Brains. They challenged short-term memory, planning, reasoning, problem solving, visuospatial skills, and math. After six weeks, the researchers found that people who did the brain training got better at the games they played, but didn't get any smarter overall.

Which is not to say that brain-training trials have come up completely empty.

In a study published in 2013 in *Nature*, Gazzaley found that a brain-training game he developed, called NeuroRacer, could help seniors improve their ability to multitask. He showed that improvements people saw could carry over into daily life, even six months later.

Another study published last year in the *Journal of the American Geriatrics Society* found that seniors who did brain training to enhance memory, reasoning, and processing speed performed better than a control group 10 years after the study ended. NIH sponsored the study.

But neither the exercises used in NeuroRacer nor those in the NIH-sponsored study are available to the public. Gazzaley is working on a new version of his program, called EVO. He hopes to get FDA approval for EVO as a medical device and offer it to patients through doctors and other medical providers.

SharpBrains CEO Alvaro Fernandez thinks the concept of brain fitness will one day be as common as physical exercise. Today, the industry may be promising more than it can currently deliver.

"In principle, everyone can benefit from this, but it has to be personalized and it has to be relevant to the individual. We're not there right now."

Reviewed by **Brunilda Nazario, MD**
WebMD Lead Medical Editor

MIND GAMES

Can you train your brain? A whole industry says yes. But are the claims true? We take a look at the evidence behind the games, apps, and programs to see if it measures up.

BY BRENDA GOODMAN

PHOTOGRAPHY BY TED MORRISON

Want to be smarter, think faster, boost your memory, and improve your focus? A billion-dollar brain-training industry is ready to help.

Seniors striving to stay mentally sharp, parents looking for drug-free ways to help kids with attention deficit hyperactivity disorder and other learning disabilities, athletes seeking a competitive edge, patients recovering from brain injuries, executives hoping to make better decisions under pressure, and patients struggling with pain—some now turn to apps, games, and programs that promise to increase the brain's fitness.

But do they work? While a handful of early experiments hint that brain training might offer some benefits, experts caution the claims have so far outstripped what science has been able to prove. Also, the fast-growing industry has operated largely unnoticed by federal regulators. Consumers can end up spending substantial amounts of money on these programs, part of an industry growing exponentially every year. What do they get in return?

"I look at it, to some degree, like the supplement industry, where people are scrambling to take this, that, and the other supplement, and there's not a lot of data showing that these supplements have that much of a positive impact," says Peter Finn, PhD, a clinical psychologist and expert in substance abuse at Indiana University Bloomington. He was just awarded a $2.3 million grant from NIH to study whether brain training to increase working memory might help alcoholics and other substance abusers.

Many brain researchers agree. In October, an international group of 69 neuroscientists and psychologists penned an open letter to caution consumers that claims made by brain-game companies aren't scientifically proven.

Even so, many serious scientists—including at least one who signed that letter—are reluctant to completely dismiss brain training, which they believe has promise, if not definitive proof. In the meantime, public and private sources are providing millions of dollars in research money to find that proof. In the past fiscal year alone, the government funded at least $5 million in brain-training studies. That doesn't include many more millions spent by private companies hoping to sell brain-training programs to consumers.

"I'm a little afraid that if the message is too strong—that this is all a bunch of made-up stuff—then we have the risk of throwing the baby out with the bathwater," says Adam Gazzaley, MD, PhD, a professor of neurology and brain-game developer at the University of California, San Francisco.

CLAIM GAME

Barely a decade old, the industry that promotes exercising your brain like a muscle is one of the fastest-growing segments of the technology market, observers say. With growth in the range of 20% to 25% each year, brain training has blossomed from a $210 million business in 2005 to one worth $1.3 billion in 2013, according to SharpBrains, an industry trade group.

Market leader Lumosity, which charges $15 per month or $80 per year for access to its brain games, has doubled its revenue every year since 2007. The company recently said it had reached 45 million members around the world.

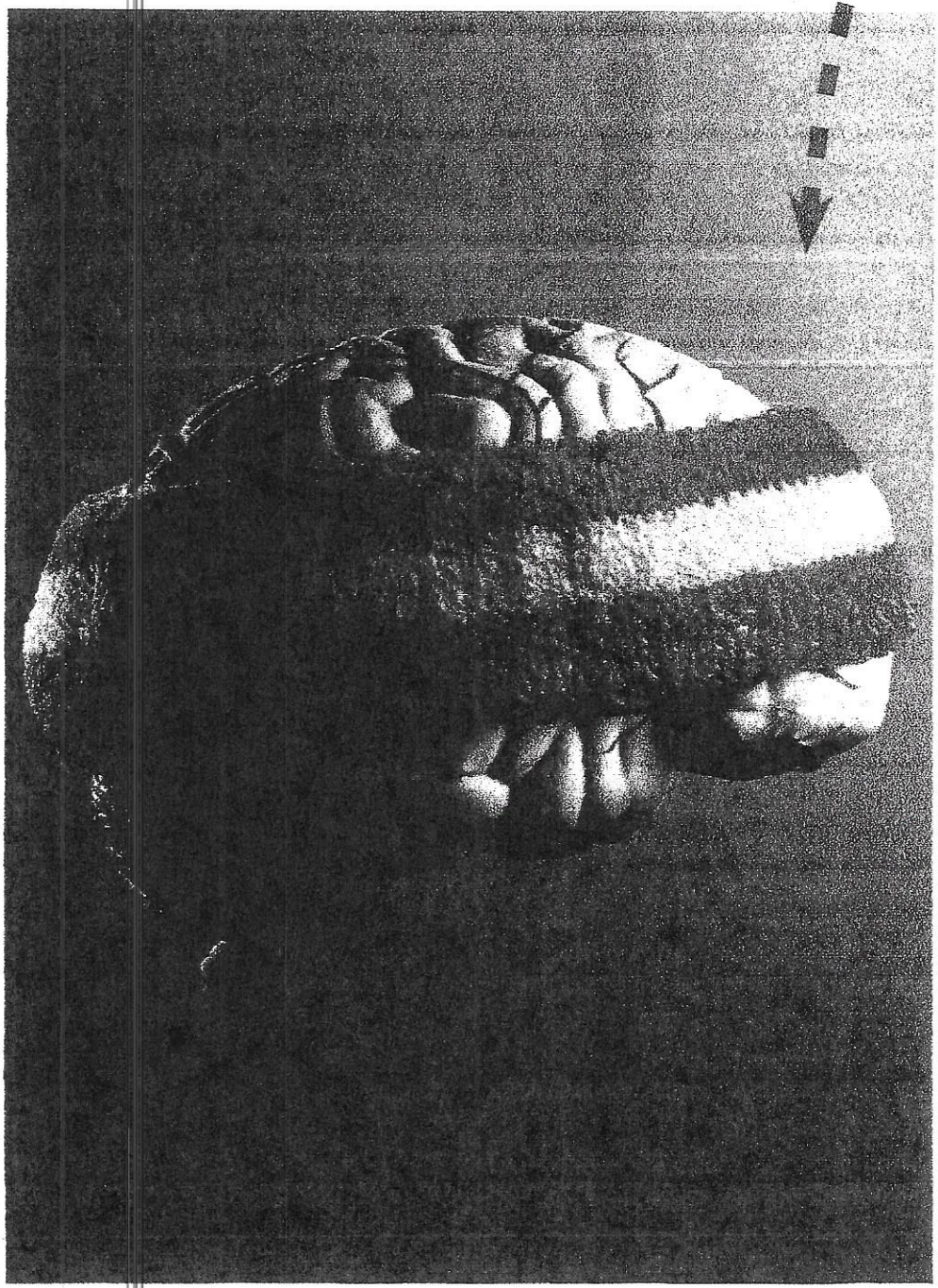
The explosive growth has been driven by consumers who download "edutainment" apps and programs to their computers, tablets, and smartphones. These people include athletes, fighter pilots, soldiers recovering from head injuries, burn victims, and children with learning disorders.

Nearly half of those who try brain training are adults age 50 and older, who, like Ann Stewart, a retired real estate executive in Berkeley, Calif., hope to keep their mental abilities sharp.

"I always thought my brain was one of my more trustworthy assets," says Stewart, 66. But then names became harder to recall, and she started doing absentminded things that shook her sense of self-reliance, like putting a carton of eggs in the freezer instead of the refrigerator. So she signed up for a study of a new brain-training game. After that ended, she continued to play other brain games. She estimates she spent $200. She has since switched to a free games app, even though she can't point to any noticeable benefits.

"I wanted to keep doing something, and an ounce of prevention is worth a pound of cure in my brain," she says.

But about half of people who've tried serious brain-training games aren't sure



Article

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The Impact of Mental Aerobics Training on Older Adults

Bert Hayslip Jr.[1], Kay Paggi[2], and Daniela Caballero[3]

Abstract

Mental Aerobics (MA) is a cognitively oriented intervention designed to improve older adults' perceptions of their cognitive ability as well as positively impact their performance. Forty-seven community-residing older adults (*M* age = 67.39, *SD* = 5.75) were randomly assigned to either a treatment (n = 24) or a waiting list control (n = 23) group. Participants in both treatment and control conditions completed measures of depression, self-rated health, cognitive functioning, and cognitive self-efficacy. Findings support the conclusion that MA can be an effective intervention in improving older adults' affectivity, everyday task self-efficacy, and self-rated health. The impact of MA on measures of fluid (Gf) and crystallized (Gc) skills was moderated by level of education. The subsequent provision of MA training to controls minimized the performance differences between the treatment and control conditions, as well as the moderating effect of level of education. These findings suggest that MA can be effectively used to enhance older adults' views of their skills, critical to efforts to maintain cognitive functioning into later life, although some older persons may benefit to a greater extent than others.

Keywords

mental aerobics, older adults, lifelong learning

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