Enhancing Your Brain Power: The ‘Use It or Lose It’ Theory of Memory and Aging

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Today’s Talk

- We will take a very holistic and interconnected approach, discussing a myriad of factors that affect cognition as we age (e.g., cognitive exercise, physical exercise, and nutrition).
- We will discuss numerous and practical ways older adults can maintain their cognitive and social well-being.
- We will discuss how to create a cognitive enhancement program.
- Bottom line is that numerous behavioral and lifestyle interventions seem to have a significant impact on the likelihood of developing dementia.
# Some Facts about Aging and Memory

- Alzheimer's disease (AD) affects approximately 5 to 10% of all adults over the age of 65. For those over the age of 85, the prevalence increases to nearly 50%.
- Nearly 1/2 of community dwelling older adults are concerned about declining memory.
- Over four and a half million older adults in the U.S. suffer from AD.
- Ten million older adults suffer from Mild Cognitive Impairment (MCI) or other more severe disorders affecting memory.
- 16% of people with MCI develop Alzheimer’s Disease each year. 80% of people with MCI will develop AD within six years (Petersen et al., 2005).

# The Problem

- Many independent older adults are not getting enough cognitive stimulation.
- Many independent older adults, regardless of health, are forced to move to assisted living facilities when their cognitive abilities deteriorate to the point of requiring additional care.
- Many ALF residents are forced to move to nursing homes when their cognitive abilities deteriorate to the point of requiring additional care.
The Problem

- Ironically, ALF residents are at risk *mentally* because all their *physical* needs are all met: cooking, cleaning, making appointments, shopping, and transportation.
- Regardless of living situation and health status, many older adults are not getting adequate cognitive stimulation.

Now the Hope

- Older adults grow new brain cells or neurons, by a process known as neurogenesis.
- Neurogenesis occurs in the adult hippocampus, olfactory bulb, striatum and possibly in other parts if the brain.
More Hope

Newborn GABA neuron in adult rat neocortex, in green box at right, appears to have arisen from precursor cell, white at left. Mature GABA neurons are red. Magnification: 650X. (Source: Heather Cameron, Ph.D., NIMH Unit on Neuroplasticity)

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More Hope

- Older adults can make new connections and rewire their brains.
- The organization and connections among neurons is more important than the number of neurons.
- What causes us to make and maintain connections among neurons?

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100 Billion Neurons with up to 20,000 Connections Each (in the cortex)
Exercise is the Key

- Older adults can improve their memory ability with regular cognitive exercise.
- The “Use It or Lose It” theory is now widely accepted by scientists.
- The “Reserve Hypothesis” is consistent with the “Use It or Lose It” theory, in that increased neuronal connectivity will lead to better functioning.

Recent Scientific Findings

January, 2005 - “Behavioral enrichment or dietary fortification with antioxidants over a long-duration can slow age-dependent cognitive decline.” Dr. Milgram et al., University of Toronto
More Scientific Findings

- Stimulating jobs are associated with decreased likelihood of having memory problems.
- Having complex and dense ideas early in life is associated with fewer memories problems later (nun study).
- Increased education is associated with a decreased likelihood of developing Alzheimer’s Disease.

Recent Scientific Findings

- July, 2003 - “More education provides older adults with a reserve that allows them to function normally in the presence of a brain disease like Alzheimer’s….However, because education is a lifelong process, it is possible that elderly people can delay or even prevent the onset of dementia by keeping their brains active.” Dr. Mortimer, Director of USF Institute of Aging.
Recent Scientific Findings

- March, 2005 - Higher levels of education are associated with different cognitive courses in AD patients. More education is associated with a relative preservation of attention and verbal processes. *Le Carret et al., Universite Victor Segalen*

- January 2006 -- Reduced volume, or atrophy, in parts of the brain known as the amygdala and hippocampus may predict which cognitively healthy elderly people will develop dementia over a six-year period, according to a study in the January issue of *Archives of General Psychiatry* by Tom den Heijer et al.
Recent Scientific Findings

- March 2006 -- Stimulating experiences may be responsible for increasing the thickness of the myelin on neurons. Alexander et al., reported that electrical stimulation caused a cascade of events that led to the development of myelin around neurons.
- Why is this important?

Myelin Increase the Speed and Efficiency of Neuronal Transmission

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4.5 Year Longitudinal Study Reported in JAMA 2002

- Wilson et al. (2002) collected baseline measures of cognitive activity on approximately 800 older adults, then they were retested after 4.5 years to see who developed AD. 111 were classified as probable or possible AD.

- Wilson et al. (2002) ranked participants as a function of the number and frequency of cognitively stimulating activities at baseline.
- They reported that people at the 50-percentile range were 28% less likely to develop dementia than people at the 10-percentile range.
- People at the 90-percentile range were 47% less likely to develop dementia than people at the 10-percentile range.
New England Journal of Medicine
June, 2003

- Dr. Verghese and his colleagues at the Albert Einstein School of Medicine followed older adults for 21 years! The researchers measured the number of cognitively stimulating activities the participants did and whether or not they developed dementia.

New England Journal of Medicine (June, 2003) Results

- The participants who did the most activities were 63% less likely to develop dementia, as compared to those who did the least.
- For every additional activity someone did on a weekly basis, there was a 7% reduction in the likelihood of developing dementia.

- The results of the New England of Journal of Medicine article are consistent with the study we conducted at Western Oregon University. We assessed the effectiveness of a comprehensive group based memory enhancement program relative to a control group. This study didn’t rely on previous cognitive ability because it was essentially an intervention.

Participants:

- Attended 3 sessions per week in their community.
- Learned about the brain and memory.
- Engaged in challenging and fun activities.
- Exercised many different parts of their brain.
- Develop better social support networks.
Clinical Research

- Participants in 7 different facilities were tested on many different memory and mental tests. Then 1/2 of the participants engaged in the cognitive enhancement program and the other 1/2 (the control group) did not. Three months later all participants were retested on the same tests. Changes over the three months were analyzed.

Memory Ability Increased after Three Months of Cognitive Enhancement Training

![Graph showing Memory Ability Increased after Three Months of Cognitive Enhancement Training](chart.png)
Cognitive Enhancement Training Led to an Increase in Perceived Memory Ability

Cognitive Enhancement Training Led to an Increase in Perceived Memory Ability

Journal of Mental Health and Aging

Conclusions

Fall, 2003 -- “If older adults can maintain their cognitive ability, they will require less care and possibly delay or even eliminate the need to go to a nursing home. Cognitively stimulating activities may also postpone symptoms of dementia, which could also delay the need for more intensive care.”

Dr. Winningham, *Journal of Mental Health and Aging*

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Cognitive Stimulation

1. Read a book
2. Order a subscription to a newspaper
3. Do crossword puzzles and other word games
4. Take a class at a senior center
5. Join a club or other organization
6. Visit with friends
7. Take a class at a community college
8. Go to a sporting event
9. Try to develop a new hobby
10. Take different routes to frequent destinations
11. Go to a different grocery store
12. Take a trip to a new place
13. Go dancing or take a dance class
14. Begin using email
Cognitive Stimulation

- 15. Volunteer
- 16. Write a letter
- 17. Join a book club
- 18. Try learning a foreign language
- 19. Part time job
- 20. Gardening
- 21. Read new magazines

- 22. Listen to the radio
- 23. Play (new?) board games
- 24. Visit museums
- 26. ElderHostel
- 25. Encore
- 26. Try using the bus
- 27. Cook new recipes
- 28. Sewing
- 29. Join a chorus or local orchestra
Cognitive Stimulation

- 30. Buy furniture that needs assembly
- 31. Get involved in politics
- 32. Program your VCR and other electronic devices
- 33. Learn to juggle
- 34. Begin journaling
- 35. Complete Puzzles
- 36. Toastmasters

- 37. Attend medical lectures at hospitals
- 38. Knitting
- 39. Try using the self-scan checkout at the grocery store
- 40. Participate in a play
- 41. Jigsaw puzzles
- 42. Volunteer at a church (e.g., teach Sunday school classes or organize volunteer efforts)
Cognitive Stimulation

43. Thinking cards, mental fitness cards
800-327-4269

44. Daily Emails
- Spanish Word of the Day http://www.studyspanish.com/dailyword/
- Investors Terms of the Day http://www.investorglossary.com/
- Jig saw puzzle http://daily.webshots.com/html/sw_jigsaw.html
- Jig saw puzzle http://www.jigzone.com/
- Cross word puzzles
- http://www.bestcrosswords.com/bestcrosswords/Home.page

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Cognitive Stimulation

45. Participate in the Academy for Life Long Learning

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Cognitive Stimulation

"The enemy of mental vitality isn't growing older. The real enemy is the passivity that tends to creep up on us as we age. The fight is not with age--it is with boredom, with routine, with humdrum." (Chernow, 1997, p. 202)

Exercise and Cognition

- Researchers have found a relationship between physical activity and cognitive ability.
- However, it should be noted that the literature is inconsistent on this issue.
Exercise and Cognition

- Colcombe and Kramer (2003) reported the results of an 18-study meta-analyses on the effects of exercise on cognition.
- They found that, on average, exercise programs lead to a .5 standard deviation increase in cognitive abilities (e.g., I.Q. of 100 versus 108).

Exercise and Cognition

- Colcombe and Kramer (2003) found that a number of variables are related to the amount of improvement associated with exercise, including
  - Age [Older (66-70 or 71-80) > Younger (55-65)]
  - Gender (F > M)
  - Type of exercise (Aerobic + Strength > Aerobic)
  - Length (6+ months > 5 or less months)
Exercise and Cognition

- Kramer et al. (2001) found that participating in a six month walking program led to increased attention in 60-75 year old adults.
- Colcombe & Kramer (2003) found that executive functioning improved more than straight memory functioning.
- The ability to pay attention to relevant stimuli is correlated with cognitive ability in older adults. It appears that exercise affects this ability.

"One of the mechanisms by which physical activity may be beneficial for cognition is that physical activity stimulates trophic factors and neuronal growth, possibly providing reserve against later cognitive decline and dementia."

(Dik et al., 2003, p. 643)

- Physical exercise may also increase cerebral blood flow.
Disclaimer

- I am not a nutrition expert but...

Nutrition

- “The only way to keep your health is to eat what you don’t want, drink what you don’t like, and do what you rather not” - Mark Twain
Nutrition and Cognition

- Fats
- Antioxidants
- Vitamins and Minerals

“Good Fat”

- Omega-3 fatty acids or “good fat” has been linked to improved cognitive functioning in older adults.
- Fish, nuts, olive oil, canola oil, and green leafy vegetables are high in Omega-3 fatty lipids.
Research

- Research has found a positive correlation between Omega-3 fatty acids levels (e.g., DHA) and cognitive functioning in older adults.
- Individuals with dementia often have lower levels of DHA than non-demented controls.
- The more fish people eat, the less likely they are to show signs of Alzheimer’s Disease.

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Research

- It may be that myelination of the axon is affected by our dietary intake of fat.

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Myelin Increase the Speed and Efficiency of Neuronal Transmission

Good Fats (High in Omega-3)

- Fish
- Nuts
- Canola Oil
- Flax Seed Oil
- Green Leafy Vegetables
- Olive Oil
Antioxidants

- Over time, our brain cells experience wear and tear from various oxidants known as free radicals (as well as cell division).
- Our bodies use antioxidants to combat the effects of free radicals.

The Top Antioxidant Fruits and Vegetables*

<table>
<thead>
<tr>
<th>Food</th>
<th>Antioxidant Power**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prunes</td>
<td>5770</td>
</tr>
<tr>
<td>Raisins</td>
<td>2830</td>
</tr>
<tr>
<td>Blueberries</td>
<td>2400</td>
</tr>
<tr>
<td>Blackberries</td>
<td>2040</td>
</tr>
<tr>
<td>Cranberries</td>
<td>1750</td>
</tr>
<tr>
<td>Strawberries</td>
<td>1540</td>
</tr>
<tr>
<td>Spinach</td>
<td>1260</td>
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<tr>
<td>Raspberries</td>
<td>1230</td>
</tr>
<tr>
<td>Brussels Sprouts</td>
<td>980</td>
</tr>
<tr>
<td>Plums</td>
<td>950</td>
</tr>
</tbody>
</table>

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The Top Antioxidant Fruits and Vegetables*

- Food Antioxidant Power**
  - Broccoli Florets 890
  - Beets 840
  - Avocados 780
  - Oranges 750
  - Red Grapes 740
  - Red Bell Peppers 710
  - Cherries 670
  - Kiwis 600

* - Based on Small (2002), p. 141-142
** - Oxygen Radical Absorbency Capacity (ORAC) per 3.5 ounces

Other Factors That May Negatively Affect Memory Ability

- Stress
- Sleep Deprivation
- Minor Ischemic Strokes
- Anxiety
- Neurodegenerative Disorders (MS, PD)
- Low Self Efficacy
- Obesity
- Diabetes
- Medications
Create your own cognitive enhancement program

- Attention activities
- Challenging homework
- Focus on making new memories
- 800-327-4269 – Thinking cards, mental fitness cards, *Aerobics of the Mind*

Sudoku

```
 2 3
1 4
3 2
1 4
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**Buzz**

- Have participants count, beginning in a clockwise direction such that the first person says “one”, the second person say “two” and so on. Instruct people to say “buzz” instead of the number if the number is a multiple of seven (e.g., 7, 14, 21, 28, 35, 42, 49, 56, 63 and so one) or if the number has a seven in the number (e.g., 17, 27, 37, etc.). The direction reverses when someone says buzz in place of the number. Even participants with moderate memory problems can learn this activity, if they do it during every session. This activity requires attention and used the frontal lobes and the right parietal lobe. To make the activity more challenging, split a large group into smaller groups; the noise of the adjacent groups require even greater use of attentional resources.
Newspaper Activities

- The Newspaper Activity actually involves several different tasks. First, get as many newspapers as you have participants. The newspapers don’t necessarily have to be the same; try to get large newspapers (e.g., New York Times or Sunday papers) for high functioning participants and smaller newspapers (e.g., local ones or mid-week papers) for lower functioning participants. Scramble the order of each newspaper, such that all the original pages are there but in random order. Then, give each participant a scrambled paper and ask them to put the pages in the original order, just as they would be in if they just purchased the paper.
- Then, find and circles ‘C’s (and R’s?), while counting them aloud.

Creative Brain Storming: Think of as many uses for a BLANK.

Think of as many uses for:
- an old rowboat
- a dime
- old car tires
- old refrigerators
- cereal boxes
- a paperclip
- plastic milk cartons
Antonyms

Antonyms are words that are opposite. In this activity participants will try to think of a word (or, in some cases words) that have the opposite meaning. You can easily vary the difficulty level. The more difficult ones are challenging for most people and may be appropriate to do in a group setting. Many of the given words have multiple antonyms so there may not be “one correct answer.”

Antonyms #1

Write in the word that is the opposite of the word listed—Example: Big - Small

Up - ____________
Hot - ____________
Winter - ____________
White - ____________
On - ____________
Over - ____________
Loud - ____________
Easy - ____________
Left - ____________
Antonyms #1
Write in the word that is the opposite of the word listed—Example: Big - Small

Indoor -
Apart -
Exhale -
Improve -
Ascend -
Civilian -
Confident -
Alone -
Amuse -
Broad -

Colorful Activities

This simple activity actually can be quite difficult. The activity exercises executive functioning.

Instructions:
Think of as many things you can that are (fill in color). This activity is good for holiday times (e.g., green St. Patrick’s Day; pink for Valentine’s Day; yellow for spring, etc.). Also, you can find color-related facts of the day to go along with this activity.

It is very important that participants know that can be as creative as they want. Anything goes with this activity. For example, one could say "shirt" for any color because a shirt can be any color.

If participants are struggling then you can suggest a strategy. For example, have them do a mental walk through their home or closet and find things that are the appropriate color.

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A-Z Activities

This activity is a great activity because it has nearly unlimited possibilities. Develop a sheet of paper and list the letters A through Z on the left side. Generate lists of certain classes of things that begin with each letter.

Here are some possibilities:
- First names
- Last names
- Female first names
- Male first names
- Animals
- Countries

Anagrams

Anagrams are words that have their letters out of order. Solving anagrams is a great activity to exercise attentional capacities. This activity can be modified for use with people of varying cognitive ability. To make the activity very easy, make sure the first two letters and last letter are in the correct position. To make the activity moderately difficult, put the first letter in the correct position, and to make the activity very challenging put the letters in random order.

- FYI, if you ever have an anagram you can’t solve, go to the following website and type it into the anagram solver:

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Natural Anagrams (a)

- ULODBRSE
- DAPISR
- ECKRE
- OBINREF

Nature Anagrams (b)

- BRODEULS
- RDAPIS
- CEREK
- BFRIONE

Split Words

- Begin by printing out sheets linked below, each sheet has approximately 12 words in large font. Cut each word out then cut the word in half. For example, take the word FAMILY and cut it into FAM and ILY. Place all word halves into an envelope. Make enough envelopes for each participant and be sure to label the envelope (e.g., Split Word #1), so you can keep track of which ones you have used and possibly reuse them at other facilities or in 6-12 months. The lists provided are appropriate for people with mild cognitive impairment, they are relative long words and the first letter is capitalized. You can make the task more difficult by using shorter words and/or not capitalizing the first word.
Certified Geriatric Wellness Instructor Program

If you are interested in becoming a Certified Geriatric Wellness Instructor and getting web access to over cognitively stimulating 200 activities, go to:

www.northwestrehab.com/courses.html

The 2-day workshops are scheduled for
- April 20-21 at Northwest Rehabilitation Associates in Salem (only room for 4 more participants)
- June 8-9 at St. Charles Medical Center in Bend

Summary

- Participation in cognitively stimulating activities is associated with decreased likelihood of developing dementia.
- Cognitively stimulating activities may delay the need for more intensive care (e.g., ALF, skilled nursing or nursing home).
- Proper food and exercise is good for the brain and memory.
- It is possible for ALFs, retirement communities, senior centers, home health care companies, and interested individuals to implement high quality cognitive enhancement programs.
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