An Integrative Approach to Memory Fitness

Margaret O’Connor PHD/ABPP
INS, July 2, 2019
Impact of Memory Loss

Relationships
Work
Daily activities
Sense of self
Future goals
History of Mnemonics

Simonides of Ceos
b. 556 BC

Method of Loci
What I won’t talk about today

External memory aids

Computer based remediation
External memory strategies
Is Computerized Working Memory Training Effective in Healthy Older Adults? (Simon et al., 2018)

82 NC assigned to Cogmed v Non–Adaptive
65–89 years (Sweden and US)
40 minutes/five days/five weeks
Adaptive condition superior for WM
### Table 3
Pre and Post means and standard deviation by intervention and site\(^a\)

<table>
<thead>
<tr>
<th></th>
<th>PRE Adaptive Group</th>
<th></th>
<th>PRE Control Group</th>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All (N = 41)</td>
<td>US (n = 19)</td>
<td>Sweden (n = 22)</td>
<td>All (N = 41)</td>
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<tr>
<td>TMT-A(^b)</td>
<td>37.5 (11.4)</td>
<td>36.4 (11.3)</td>
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<td>TMT-B(^b)</td>
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<td>82.4 (25.6)</td>
<td>85.5 (25.5)</td>
<td>97.1 (55.7)</td>
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<tr>
<td>Digit Symbol</td>
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<td>63.3 (17.0)</td>
<td>46.1 (13.1)</td>
<td>53.0 (11.5)</td>
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<tr>
<td>COWAT</td>
<td>42.4 (11.3)</td>
<td>44.7 (15.4)</td>
<td>46.2 (20.4)</td>
<td>42.1 (9.7)</td>
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<tr>
<td>Semantic Fluency(^c)</td>
<td>44.5 (11.5)</td>
<td>42.2 (8.6)</td>
<td>45.0 (15.5)</td>
<td>43.7 (11.6)</td>
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</table>

<table>
<thead>
<tr>
<th></th>
<th>POST Adaptive Group</th>
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<th>POST Control Group</th>
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<td></td>
<td>All (N = 37)</td>
<td>US (n = 18)</td>
<td>Sweden (n = 19)</td>
<td>All (N = 40)</td>
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<td>TMT-A(^b)</td>
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<td>36.9 (10.5)</td>
<td>36.1 (8.7)</td>
<td>37.1 (13.0)</td>
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<td>TMT-B(^b)</td>
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<td>76.6 (34.6)</td>
<td>80.0 (25.1)</td>
<td>88.6 (38.8)</td>
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<td>Digit Symbol</td>
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<td>67.7 (11.7)</td>
<td>55.5 (10.8)</td>
<td>54.9 (13.9)</td>
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<td>COWAT</td>
<td>45.9 (15.2)</td>
<td>43.5 (10.0)</td>
<td>48.1 (18.9)</td>
<td>44.8 (11.6)</td>
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<tr>
<td>Semantic Fluency(^c)</td>
<td>43.4 (11.3)</td>
<td>43.5 (9.3)</td>
<td>43.4 (12.8)</td>
<td>44.7 (12.2)</td>
</tr>
</tbody>
</table>

\(^a\)Data represents raw scores; \(^b\)The more negative values represents the better performance; \(^c\)3 categories. COWAT, Controlled Oral Word Association Test; TMT, Trail Making Test.
Fig. 3. Cognitive performance in Digit Symbol test. *Represents $p < 0.05$, indicating a significant time-by-group interaction. Error bars represent standard errors.
Doctor, Should I use Computer Games to Prevent Dementia? (O’Shea et al. 2019)

Review of CCT interventions for MCI
15 unique studies identified
9 of 12 should significance on memory
Brain games modestly benefit cognition but do not prevent dementia
What I Will Talk About Today

A few studies (out of many) on efficacy

Clinical application

Importance of remote personal memories
Issues to Consider

Participants (age, severity of deficit)
Approach (multi or unimodal)
Duration of training
Adherence
Outcome persistence
Disease modification
Relevance to daily life
Memory Training Intervention for Older Adults: A Meta–Analysis (Gross et al, 2012)

35 (of 402) studies from last 50 years
Criteria for inclusion
- Evidence based treatment
- Original data
- People >60
- Nonpharmacological

Most common – MoL, association, imagery, categorization
Trainees – improved .31 SD
Long Term Effects of Cognitive Training on Everyday Functional Outcomes in Older Adults (Willis et al., 2006)

ACTIVE large, multi-center trial of cognitive training of 2,802 (65+) adults/6 weeks
3 interventions v no contact control
Memory strategies
- Method of Loci
- Organization
- Association
- Visualization
Results– improved memory for five years
Activation and Effective Connectivity for Face-Name Changes Following Explicit Memory Training In Patients with Mild Cognitive Impairment: A Pilot Study (Hampstead et al., 2011)

- fMRI study of 90 face-names
- Training – linking name to facial feature
- N= 6 amnesic patients; 5 sessions/2 weeks
- Post training behavioral improvement
- Activation in widespread areas
Figure 1.
Mnemonic Strategy Training Improves Memory For Object Location Association in Both Healthy Elderly and Patients with Amnestic Cognitive Impairment (Hampstead et al., 2012)

- N = 21 HC v 28 MCI
- 45 object locations
- 3 training sessions/2 weeks
- Post training behavioral improvement
- Persisted for one month
- Activation in widespread areas
Mnemonic Strategy Training Partially Restores Hippocampal Activity in Patients with Mild Cognitive Impairment (Hampstead et al., 2012)

- MCI v HC
- 3 sessions of training or no training
- Pre-training MCI reduced hippocampal activity
- Post training MCI (trained) increased activity
- Training facilitated hippocampal functioning
FIGURE 2. Between intervention group differences in retrieval-related activity. Top row—the MCI MS group demonstrated significantly greater activity than the MCI XP group for both the trained (A) and untrained (B) stimuli. Bottom row—the HEC MS group demonstrated reduced activity relative to the HEC XP group in the body of the right hippocampus when retrieving the trained stimuli (C), but increased activity in the right hippocampal head for the untrained (novel) stimuli (D). Average beta weights for each group are shown in the corresponding graphs (error bars represent the SEM). L = left; R = right; HH = hippocampal head; HB = hippocampal body; HT = hippocampal tail.
Finnish Geriatric Intervention Study to Prevent Cognitive Impairment and Disability: FINGER (Nagandu et al, 2015)

- 2 year intervention: diet, exercise, cognitive training, and health monitoring
- 1260 Intervention vs 631 Control
- Significant improvement on cognitive measures as well as BMI, diet, and exercise
Finger Results

Overall

Executive Function

Baseline 12 months 24 months
Baseline 12 months 24 months
Finger Results

**Processing speed**
- Baseline
- 12 months
- 24 months
- p = 0.03

**Memory**
- Baseline
- 12 months
- 24 months
- p = 0.36

Lines represent control (blue) and intervention (red) groups.
Behavioral Interventions to Prevent or Delay Dementia: Protocol for a Randomized Comparative Effectiveness Study (Smith et al., 2017)

Healthy Actions to Benefit Independence and Thinking (HABIT)

- 4 sites (Mayo AZ, FL, MN), U Wash Seattle
- N=272 couples
- Outcome –6,12, 18 months
- 5 hours/5 days week X 2 weeks
Behavioral Interventions to Prevent or Delay Dementia: Protocol for a Randomized Comparative Effectiveness Study (Smith et al., 2017)

- Hatha yoga
  - 60 minutes daily/150 minutes weekly post
- Computer (Brain HQ)
  - 60 minutes daily/150 minutes weekly post
- Wellness education
- Support (patient and caregiver)
- Memory support (calendars, lists)
<table>
<thead>
<tr>
<th>Characteristic</th>
<th>No Yoga (n = 56)</th>
<th>No CCT (n = 54)</th>
<th>No Wellness Education (n = 52)</th>
<th>No Support Groups (n = 53)</th>
<th>No MSS (n = 57)</th>
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<td>Age, mean (SD), y</td>
<td>74.3 (7.3)</td>
<td>75.8 (8.0)</td>
<td>76.7 (7.3)</td>
<td>75.1 (7.3)</td>
<td>74.1 (7.9)</td>
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<td>Education duration, median (range), y</td>
<td>17 (9-20)</td>
<td>16 (12-20)</td>
<td>16 (12-20)</td>
<td>16 (10-20)</td>
<td>16 (6-20)</td>
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<td>Male, No. (%)</td>
<td>34 (60.7)</td>
<td>33 (61.1)</td>
<td>30 (57.7)</td>
<td>32 (60.4)</td>
<td>31 (54.4)</td>
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<td>Race other than white, No. (%)b</td>
<td>3 (5.4)</td>
<td>1 (1.9)</td>
<td>1 (1.9)</td>
<td>2 (3.8)</td>
<td>5 (8.8)</td>
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<td>Partner relationship, No. (%)</td>
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<td>Spouse or partner</td>
<td>52 (92.9)</td>
<td>44 (81.5)</td>
<td>42/50 (84.0)</td>
<td>48 (90.6)</td>
<td>43/55 (78.2)</td>
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<td>Son or daughter</td>
<td>2 (3.6)</td>
<td>6 (11.5)</td>
<td>4/50 (8.0)</td>
<td>3 (5.7)</td>
<td>8/55 (14.5)</td>
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<td>Using nootropics, No. (%)</td>
<td>27/55 (49.1)</td>
<td>24 (44.4)</td>
<td>16/49 (32.7)</td>
<td>11 (20.8)</td>
<td>22/53 (41.5)</td>
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<td>DRS-2 total score, mean (SD)</td>
<td>130.1 (8.7)c</td>
<td>127.5 (9.3)</td>
<td>128.0 (8.0)a</td>
<td>130.9 (7.6)</td>
<td>129.9 (8.8)d</td>
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<td>CDR score, No. (%)</td>
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<td>0, None</td>
<td>4/55 (7.3)</td>
<td>1 (1.9)</td>
<td>5 (9.6)</td>
<td>4 (7.5)</td>
<td>7 (12.3)</td>
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<td>0.5, Questionable</td>
<td>51/55 (92.7)</td>
<td>53 (98.1)</td>
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<td>50 (87.7)</td>
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<td>REACH anxiety score, mean (SD)</td>
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<td>18.1 (5.2)e</td>
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<td>17.8 (4.8)f</td>
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<td>QOL-AD score, mean (SD)</td>
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<td>40.9 (5.7)a</td>
<td>39.1 (5.0)e</td>
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<td>39.9 (5.5)</td>
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<td>Mood score, mean (SD)</td>
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<td>12.6 (8.5)e</td>
<td>10.5 (7.2)</td>
<td>12.8 (6.8)f</td>
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<td>Self-efficacy score, mean (SD)</td>
<td>74.1 (13.0)</td>
<td>74.1 (15.7)a</td>
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<td>72.6 (15.2)f</td>
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<td>mADL score, mean (SD)</td>
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<td>19.2 (5.4)</td>
<td>18.3 (4.9)f</td>
<td>18.9 (4.8)a</td>
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</tr>
</tbody>
</table>
Integrative Approach to Memory Fitness

- Education
- Strategies
- Group format
- Healthy lifestyle
- Personal memories
An Integrative Approach to Memory Fitness: EDUCATION
What is Memory?

Long-term memory

Procedural memories
("Knowing how")

Declarative memories
("Knowing that")

Semantic memories
(General knowledge)

Episodic memories
(Personal recollections)
Semantic and Episodic Memory

Semantic (Facts) – ages well
- Your vocabulary
- Fact knowledge (7x7=49; Ringo Starr)
- Independent of a specific learning context

Episodic (Events) – vulnerable to forgetting
- What you had for breakfast
- How you spent your last birthday
- What? When? Where?
Memories are in Networks
Where is memory? Papez Circuit
Storage of names, faces and new events is mediated by the hippocampus (sea horse) within the limbic system.
3 Stages

Encoding (1\textsuperscript{st})
Getting the information IN

Storage (2\textsuperscript{nd})
Holding onto the information

Retrieval (3\textsuperscript{rd})
Getting the information OUT (remembering)
Attention is the FIRST step of memory formation.

Our memory capacity is limited, but paying attention maximizes our ability to form new memories:
For information to become secured in long-term memory, the neural pathway must be strengthened.

This process occurs over a period of minutes, hours, days or even longer.

Leads to creation of new neuronal connections
Memory Retrieval

Each memory - unique address

Your brain must reactivate that neuronal pattern

Even if there is nothing wrong with your memory, it can take seconds to recall complex information that you haven’t accessed in a long time
An Integrative Approach to Memory Fitness: STRATEGIES
Five Minute Summary

CLEAN THE DECK
- Mindfulness will make you more receptive
- Use of external aids “declutters” your memory

BE IN THE ZONE
- Make eye contact when talking
- Reflect back on events

WORK ON NETWORKING
- Link the new with the old to make stable memories

UPFRONT MANAGEMENT
- Reduce the informational load via strategies
- Manage the conversation (don’t let someone talk at you)

USE YOUR MIND’S EYE
- Visual images are powerful and integrative

REPETITION, REPETITION, REPETITION
- Spaced presentation in different places or different ways
Common Mnemonics

Categorization (reduce the load)
- Acronyms (letter and sentence)
- Chunking

Associations/Imagery (broaden the trace)
- Pegwords
- Method of Loci

Spaced repetition (strengthen network)
Ways to Bolster Your Short Term Memory

Grouping items into smaller chunks or semantic units based on shared attributes makes encoding and retrieval easier.

The Magical Number Seven, Plus or Minus Two

George A. Miller
Encoding (Intake) Management

- REDUCE THE LOAD: $1-6-5-9-3-8-6-5 = 165-93-865$)

- ACRONYMS: NBA, SCUBA

- SENTENCES: EGBDF (Every Good Boy Deserves Fudge)
Upfront Management: Network

Association networks store patterns of events via interconnections between neurons.

Elaboration strategies use networks (semantic memory) to broaden associations – memories are more secure.
Semantic Memory
Levels of Processing

1. Structural
   What does the word look like?
   Is the word in capital letters?

5. Phonetic
   What does the word sound like?
   Does the word rhyme with ... ?

9. Semantic
   What does the word mean?
   Does the word fit in this sentence?
Craik & Tulving, 1975, Exp 1

**Level of Processing**

- Word Present?
- Capital Letters?
- Rhymes with?
- Category member?
- Fits in sentence?

**p(Recognized)**

- Word Present?: 0.2
- Capital Letters?: 0.2
- Rhymes with?: 0.8
- Category member?: 1.0
- Fits in sentence?: 1.0
The Self-Reference Effect

People remembered words significantly better when they processed them in reference to themselves.

The more you personalize something, the better you will remember it.
Self Imagining Enhances Recognition Memory in Memory Impaired Individuals with Neurological Damage (Grilli and Glitsky, 2014)

Imagining event from personal perspective – enhances memory (e.g., you are at a basketball game): visual, spatial, self–referential

CI = 14; NCI = 14

Significant effects of self imaging
Visual Imagery

Picture Superiority Effect

Visual imagery may be effective because the occipital region of the brain does not deteriorate with age

Imagery – powerful encoding strategy
- Verhaeghen et al. (1992)
- Glisky and Glisky (2008)

May involve link to spatial cue (MoL)
Key word (Peg method)
Face/Name association
Picture Superiority Effect

Memory retention after 3 days

10% Text Only

65% Text + Picture

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Imagery: Using Your Mind’s Eye

- Dog
- Cement
- Boots
- Garden
- Sunglasses
- Overalls
Remembering Names: The Association Technique

Associations should come easily

Unique and bizarre

Personal significance

Visual – use face features
Create Links – Old with New

Associations provide *cues* for retrieval
Method of Loci

Uses visualization to organize and recall

Premise: it is easy to recall familiar locations. Pair items with specific locations (e.g., your house)

Associate an object with each room of your house

When objects need to be recalled think of your house

MoL – Increased activation in occipital lobe

Validated in many studies
How to Memorize a Recipe Using the Method of Loci?

- 2 Eggs
- 1 Cup of Sugar
- 1 Cup of Milk
- 4 Cups of Flour
- 1 Cup of Nuts
- 1 Tsp Salt

DevelopingHumanBrain.org
(a) Memory performance for a 2000-word text at a short retention interval as a function of type of presentation (written vs. oral) and learning strategy (rehearsal vs. method of loci). (b) Memory performance at a 1-week retention interval as a function of type of presentation and learning strategy. Data from De Beni et al. (1997).
Do Older Adults use Method of Loci: Results from the Active Study (Gross et al, 2014)

Do older adults use MoL spontaneously?

Is it too attentionally demanding?

ACTIVE participants
N=703 memory v 698 NC
Examined recall of long word list (AVLT)
Results: 25% participants used MoL
Pegwords

Associations b/w nouns and numbers

Words rhyme with numbers (e.g., 1 = gun; 2 = shoe; 3 = tree, etc)

To remember words: apple, butter, pencil

apple – apple being shot from a gun
butter – shoe stepping on butter
pencil – tree pierced by a pencil
In this scenario, Fred is arriving at the grocery store having trouble remembering what he is there to pick up. By using the PegWord technique is able to distinguish what things he needs to get while he is there.
Repetition

NOVELTY (activates the hippocampus)
NETWORKING (broadens the connection)

How do we do this?
Repeat at different times (e.g., when learning the names of a family at church, repeat after church, 2 hours later and 1 day later). Distribute across time makes stronger connections

Repeat in different ways (e.g., Shuffle the deck!. When learning the names of a family, start with the youngest. On another occasion, start with the oldest OR hear something and then write it down)
Hermann Ebbinghaus (1850–1909)

German Psychologist

• Learning Curve
• Serial Position
• Forgetting Curve
• Spacing effects
Ebbinghaus Forgetting Curve

Retention (%) vs. Elapsed Time Since Learning

- Immediately: 100%
- 20 minutes: 58%
- 1 hour: 44%
- 9 hours: 36%
- 1 day: 33%
- 2 days: 28%
- 6 days: 25%
- 31 days: 21%
Ebbinghaus: Spaced Repetition
(Memory: A contribution to Experimental Psychology, 1885)
Spaced Training: How Does It Work?

Encoding variability (multiple contexts)
  ◦ (stated independence)

Study phase retrieval – each trial elicits reactivation (in massed trials prior trace is still active and cannot be reinforced)

Deficient processing in massed practice – habituation effect
Participants who used spaced practice on memory tasks outperformed those using massed practice in 259 out of 271 cases.

96% Percent More Effective

Cepeda (2006)

Ebbinghaus & Goddard
An Integrative Approach To Memory Fitness: GROUP
GROUP FORMAT

Teaching function

Therapeutic power of social interaction

Making it real – feedback, sharing, examples from daily life
Groups provide socialization

- Loneliness has negative effects on brain structure and function in the amygdala, prefrontal cortex, and hippocampus (Ehlers, et. al., 2017).

- People who are more socially active and who do not feel socially disconnected experience less cognitive decline than do their less-active and more-disconnected counterparts.
Six Steps to Cognitive Health

- Eat a plant based diet
- Exercise regularly
- Get enough sleep
- Manage stress
- Emotional health
- Challenge your brain
Neurogenesis and Plasticity

THEN: The brain is equipped with a finite complement of neurons. Once a neuron dies, it is never replaced. Aging entails a relentless, subtractive process.

NOW: The change in the absolute number of neurons is not significant. New neurons sprout in the hippocampus throughout the lifespan.

An Integrative Approach to Memory Fitness: LIFESTYLE
Mediterranean Diet
Five year study of 7,4447 people on 3 diets Mediterranean diet with nuts or olive oil – improved cognition and cardiovascular health
Incidence of Endpoint

Predimed Primary Endpoint
(acute myocardial infarction, stroke, or death from cardiovascular causes)

- Control diet
- Med diet, nuts
- Med diet, EVOO

Graph showing the incidence of endpoint over years for different diets.
An Integrative Approach to Memory Fitness: EXERCISE
Exercise Regularly

- Prevents weight gain
- Lowers blood pressure
- Lowers risk of heart disease, strokes
- Decreases diabetes
- Improves flow of oxygen to the brain
- Improves volume in hippocampus
- Maintains integrity of white matter
Exercise and Memory

Animal research:
- Exercise upregulates BDNF expression in the hippocampal and cortical neurons
- BDNF is a major regulator of synaptic plasticity (Hopkins and Bucci, 2010)
- Running increases dendritic complexity and the number of dendritic spines in the dentate gyrus (Eadie et al., 2005)

Human research:
- In adults, aerobic exercise was associated with improved cerebral blood volume in the dentate gyrus of the hippocampus.
- In humans, exercise helps with new memory formation.

Figures above adapted from Pereira et al., (2006).
Exercise and Memory

- Mild-to-moderate exercise over 1 year appears to prevent hippocampal neuronal loss

**Design:**
- Randomized controlled clinical trial
- 120 adults aged 55 to 80 years
- Aerobic exercise training Vs. stretching and toning condition

In the aerobic exercise group, there was a positive relationship between improvements in spatial memory performance and hippocampal volume, suggesting that 1 year of exercise augments memory function in late adulthood.

*Figure above adapted from Erickson et al., (2011) Exercise training increases size of the hippocampus and improves memory. PNAS, 108,7, 3017-3022.*
An Integrative Approach to Memory Fitness: SLEEP
Get Enough Sleep

- As we get older—less deep and REM sleep, more wakenings

- Sleep–wake cycle influences levels of amyloid

- Sleep deprivation increases amyloid. Sleep extension—opposite effect. Once amyloid accumulates there is increased wakefulness
Sleep Cycle

1. Interim between consciousness and sleep
   - Move to stage 2 after 15-20 min

2. Heart rate slows, brain does less complicated tasks
   - After another 15 min, move into non-REM sleep, the Delta stage

3. Body makes repairs

4. Body temperature & BP decreases
   - Move into REM sleep approx. 90 min after first feeling sleepy

5. Increase in eye movement, heart rate, breathing, BP & temperature

BP = Blood Pressure
Five Sleep Stages: REM/NREM

- NREM Stage 1: light sleep, fast waves, low amplitude
- NREM Stage 2: spindles
- NREM Stages 3 & 4: deep, slow wave sleep. Low frequency, high amplitude. Consolidation
- REM: Active. Fast waves, low voltage. Dreaming, memory
Get Enough Sleep

- The sleep–wake cycle influences levels of amyloid
- Sleep deprivation increases amyloid
  Sleep extension – opposite effect. Once amyloid accumulates – increased wakefulness and altered sleep patterns
Sleep Apnea

Fragmented sleep/low blood oxygen

Sleep apnea results in tissue loss in brain regions important for memory

Brain scans reveal that the mammillary bodies (in box) of a sleep apnea patient (right) are smaller than those of a control subject (left).
An Integrative Approach to Memory Fitness: STRESS
Effects of Stress on Memory

Effects of Chronic Stress on Memory Decline in Cognitively Normal and Mildly Impaired Older Adults

Guerry M. Peavy, Ph.D.
David P. Salmon, Ph.D.
Mark W. Jacobson, Ph.D.
Aaron Hervey, Ph.D.
Anthony C. Gamst, Ph.D.
Tanya Wolfson, M.A.
Thomas L. Patterson, Ph.D.
Sherry Goldman, M.A.
Paul J. Mills, Ph.D.
Srikrishna Khandrika, Ph.D.
Douglas Galasko, M.D.

Objective: The literature provides evidence of a strong relationship between greater stress and memory loss, but few studies have examined this relationship with both variables measured over time. The authors sought to determine the prospective association between subjective and objective measures of chronic stress and rate of memory decline in cognitively normal and mildly impaired older adults.

Method: This longitudinal study was conducted at a university research center and included 61 cognitively normal subjects and 41 subjects with mild cognitive impairment (ages 65–97). Fifty-two subjects were followed for up to 3 years (mean=2 years) and received repeated stress and cognitive assessments. Exclusion criteria were dementia, significant medical or psychiatric conditions, and medication use (e.g., corticosteroids) that might affect cortisol level or cognitive functioning. The main outcome measure was a regression-based slope reflecting performance change on tests of global cognition and episodic memory as a function of baseline diagnosis, recent life events, and salivary cortisol. Examiners were blind to stress ratings and cortisol levels at the time of cognitive testing.

Results: Higher event-based stress ratings collected over the follow-up period were associated with faster cognitive decline in subjects with mild cognitive impairment but not in cognitively normal subjects. In contrast, higher cortisol levels were associated with slower cognitive decline in subjects with mild cognitive impairment but not in cognitively normal subjects.

Conclusions: Chronic stress affects cognitive functioning differently in cognitively normal subjects and those with mild cognitive impairment. Cortisol, while likely to have neurotoxic effects over time, may enhance cognitive functioning in older adults compromised by existing cognitive deficits.
The Inverted U Stress Response Curve
A Cognitive Perspective

Adapted from: https://explorable.com/how-does-stress-affect-performance
Negative effects of stress CAN be reduced:

- Physical exercise
- Diet
- Medications
- Positive attitudes and beliefs
- Mindfulness
Mindfulness Based Interventions

Work by Jon Kabat-Zinn at UMass

Typically taught over the course of an 8 week program

Interventions focus on:
  • Non-judgmental attention to internal experiences (e.g. breath or a bodily sensation)
  • Non-judgmental attention to external experiences (e.g. a sound or feeling)
  • Attempts to stay in the present moment
  • Practicing mindful attitudes (e.g. acceptance and patience)
Mindfulness

Target symptoms (concentration)

Enhance well-being

Allows you to be receptive

Reflection – fully present during and after
An Integrative Approach to Memory Fitness: EMOTIONAL HEALTH
Depressed mood – higher incidence of mild cognitive impairment and dementia

Depression may lead to deficits in long-term potentiation – crucial for synaptic plasticity

Greater hippocampal atrophy
Positive Attitudes and Beliefs

SELF–EFFICACY:

- Individuals who believe that they are likely to succeed are more likely to engage in behaviors they believe will achieve desired goals.
- More likely to adhere to physician regimens, to be active in everyday life, and to maintain exercise.

CONTROL BELIEFS:

- Individuals who believe that there are things they can do to influence memory – use strategies to improve.
- In older adults, a sense of control – greater willingness to use compensatory strategies and more successful adaptation to aging.
Positive Attitudes and Beliefs

- When negative stereotypes of aging are activated performance on cognitive tasks may suffer (Lamont, Swift and Abrams, 2015).

- Research suggests this is due to stereotype threat and related to the interfering effects of anxiety.

- Reframing the way we think to focus on positive aspects of the self helps to combat the effects of stereotype threat.

- For example, instead of saying “I’m having a senior moment” when forgetting something, you might say “I’m blocking on that at the moment.”
Negative Thinking

Age stereotypes – negative impact on performance (Lamont, Swift and Abrams, 2015).

Studies on stereotype threat

Focus on positive – mitigates stereotype threat

Avoid self effacing comments (e.g., “I’m having a senior moment”)

An Integrative Approach to Memory Fitness: INTELLECTUAL STIMULATION
Challenge Your Brain

Increasing intellectual engagement in mid to late life staves off cognitive impairment by **7.3 YEARS**

2017 Mayo Clinic study by Krell–Roesch et. al.: Activities 1–2 times a week resulted in decreased mild cognitive impairment:
- Playing games (e.g. bridge, chess, etc.)
- Arts and craft activities
- Computer use
- Social activities (e.g. theater, movies, etc)
The Nun Study

NIA longitudinal study of aging and Alzheimer's disease

David Snowden Ph.D. (began at U. Minn., then to U Kentucky)

Begun in 1986; 678 Sisters of Notre Dame, aged 75–102, located in 7 centers in the US

All agreed to brain donation

Intellectual activity – neuroprotective
Sister Matthia – model of healthy aging.

Employed as a teacher for 62 years. Retired at the age of 77.

During retirement she was actively engaged; She was dementia free until her death at 104.

Postmortem exam – atherosclerosis and Alzheimer’s disease.

Cognitive reserve: lifelong intellectual stimulation may have helped her withstand age related neuronal loss.

Image adapted from: Snowdon, 2003, Healthy aging and dementia: Findings from the Nun study.
Cognitive Reserve: Yaakov Stern

Based on lifetime of education, work, mental stimulation.

Greater CR → less impact on function with similar level of pathology

A well furnished brain – safety net to withstand aging and dementia
Overview of Personal Memories

- Organizing principle for self-knowledge
- Provides context in your life
- Critical for your relationships
November 22, 1963
Personal Flashbulbs

- Birth of a child
- Death of a loved one
- Diagnosis of an illness
Your Timeline: Think Chronologically and Dig Deep

The sequence of salient events in your personal life

Putting your timeline on paper is a wonderful way to revisit life events and achievements

Use your family tree
The Story of Me Timeline

**Born**
- September 22nd, 1995
- Orange, CA
- Son of Iranian Immigrants

**Childhood years**
- Father diagnosed w/ PD
- Grew up in mother’s daycare

**Early adulthood**
- Picked up the guitar (14 years ago)
- Began playing tennis
- Developed interest in

**Middle adulthood**
- Accepted to Harvard
- Studied Biology
- Formed a Rock Band
- Lived in Dorm in Harvard

**Present years**
- Graduated from college
- Working at BIDMC
- Applying to Medical
What’s in a name?

- Think of how your name defines you
- Is there a story behind your name?
- Does your name reference someone from your past?
Important Person From the Past

- What is your first memory of me?
- What makes us such good friends?
- How would you describe me?
- Is there anything that you have always wanted to tell me but haven’t?
- Are you proud of me?
Accomplishments

- What did you want to be when you grew up?
- What are you proudest of in your life?
- Why was this important?
- What lessons has your work life taught you?
- If you could do anything now, what would you do? Why?
Favorite Songs

Where were you?
Who were you with?
How did you feel?
Values and Sources of Strength

- Personality traits that you are most proud of (loyal friend, generous person...)
- World issues that you feel passionate about (peace, environment, social justice, etc.)
- Most important lessons in your life?
- Spirituality (prayer, meditation, etc.)
- Do you believe in a higher power?
- Do you have any regrets?
- How would you like to be remembered?
The Videos

- A snippet of your legacy
- Who is your audience?
- What is your “take away” message?
Takeaways?

• Optimal brain health: multi-modal interventions

• Progress should be measured with objective assessments of mental and physical fitness using state of the art technology and biomarkers

• Interventions – tailored to each person’s unique needs and habits

• It is critical to implement interventions that are appealing, fun and emotionally satisfying!