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Cognitive Training Interventions for Delaying Cognitive Decline

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Disclosures

- No relevant financial disclosures

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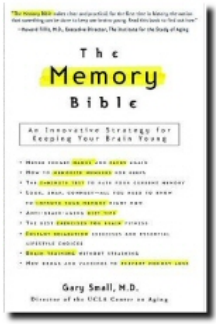
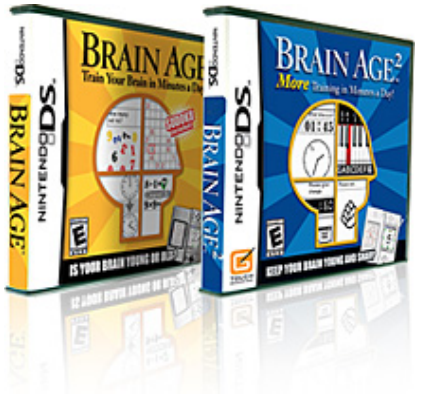
Brain Fitness is Popular!



dakim BrainFitness™



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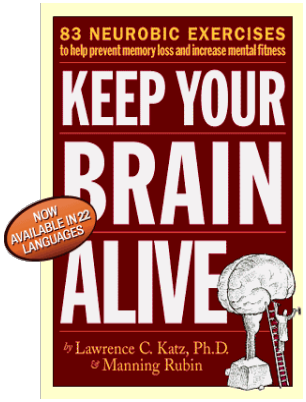

HAPPY neuron Brain Fitness For Life

BrainBuilder.com

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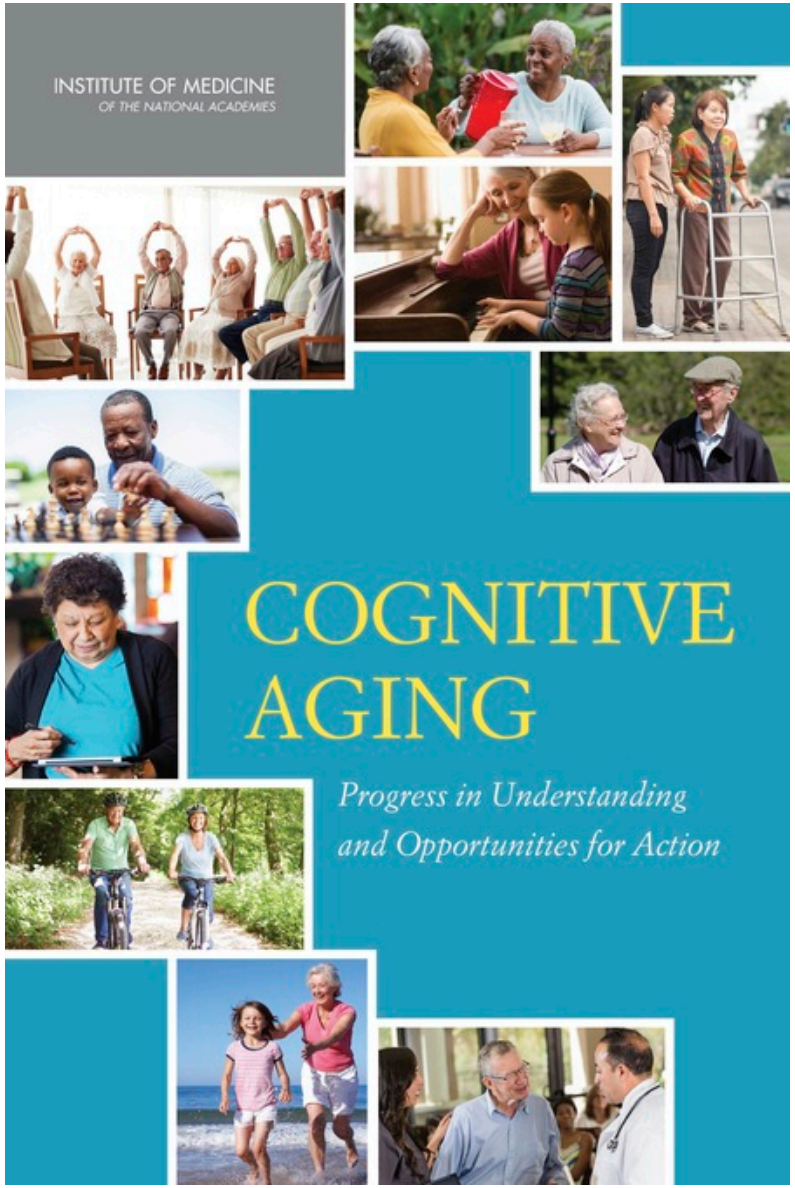

Major focus in a 2015 report from the Institute of Medicine

http://www.nap.edu/catalog/21693/cognitive-aging-progress-in-understanding-and-opportunities-for-action

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Cognitive Stimulation vs. Training

- **Cognitive stimulation**: crossword puzzles, card games, etc.

- **Cognitive training**: formal instruction and strategies

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Key Questions

- **<u>Does stimulation and/or training:</u>**
  - ➢help maintain or enhance memory and thinking ability?
  - ➢help with real world tasks?
  - ➢transfer to another, non-trained cognitive domain?

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Training Examples

- Randomized clinical trial - the ACTIVE trial
- Training + non-pharmacological treatment - FINGER
- Embed in “real world” community settings - Experience Corps

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ACTIVE

- Advanced Cognitive Training for Independent and Vital Elderly
- Memory, reasoning, or speed of processing training vs. control group

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ACTIVE Participants

- Targeted older adults at risk for decline recruited from 6 sites across United States
- Excluded:
  - Age < 65 years
  - Substantial cognitive decline
    - MMSE < 23
    - self-reported Alzheimer's disease
  - Substantial functional decline
    - Assistance with dressing, personal hygiene, bathing
  - Specified predisposing medical conditions

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Baseline Characteristics (N = 2,802)

Mean Age [range]	73.6±5.9 [65-94]
Gender, % Female	75.9%
Race, % African American	26.0%
Education, % HS diploma	88.6%
Marital status, % married	35.9%
Mean MMSE score [range]	27.3±2.0 [23-30]

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Training in ACTIVE

- 10, 60-75 minute training sessions
- Small groups, led by instructor, individual & group exercises
- Focus on strategies for problem solving, remembering, or responding quickly to information
- Goal to apply learned strategies to real-world tasks
- Did not “teach to the test”

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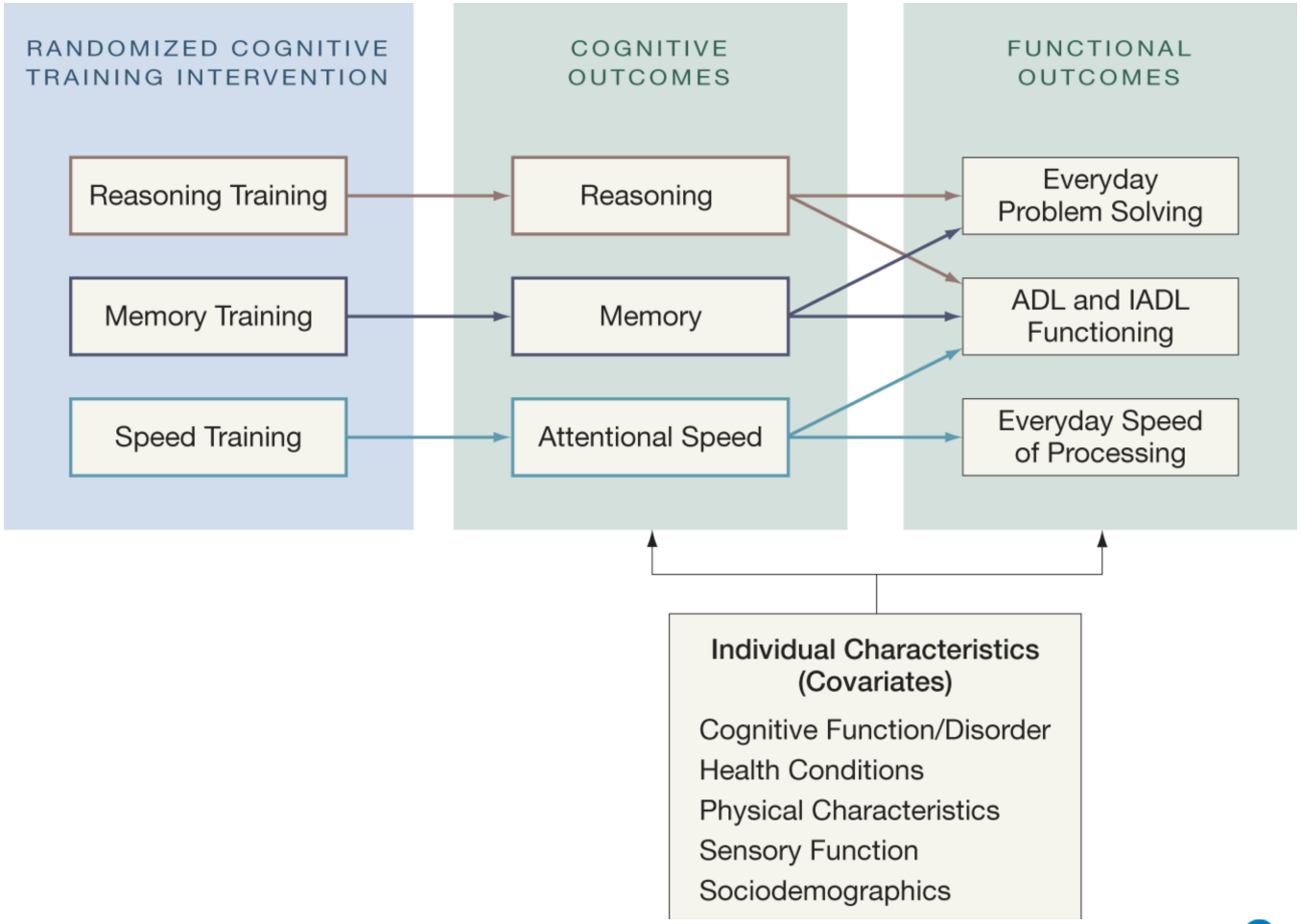
ACTIVE Conceptual Model



Willis et al, JAMA. 2006;296(23):2805-2814.

ACTIVE Training

- **Memory Training**
  - Grouping items into meaningful categories
  - Visual imagery & associations
  - Hierarchical ordering
  - External aids & cues
- **Reasoning Training**
  - practice solving problems using rule/pattern
- **Speed of Processing**
  - Useful field of view

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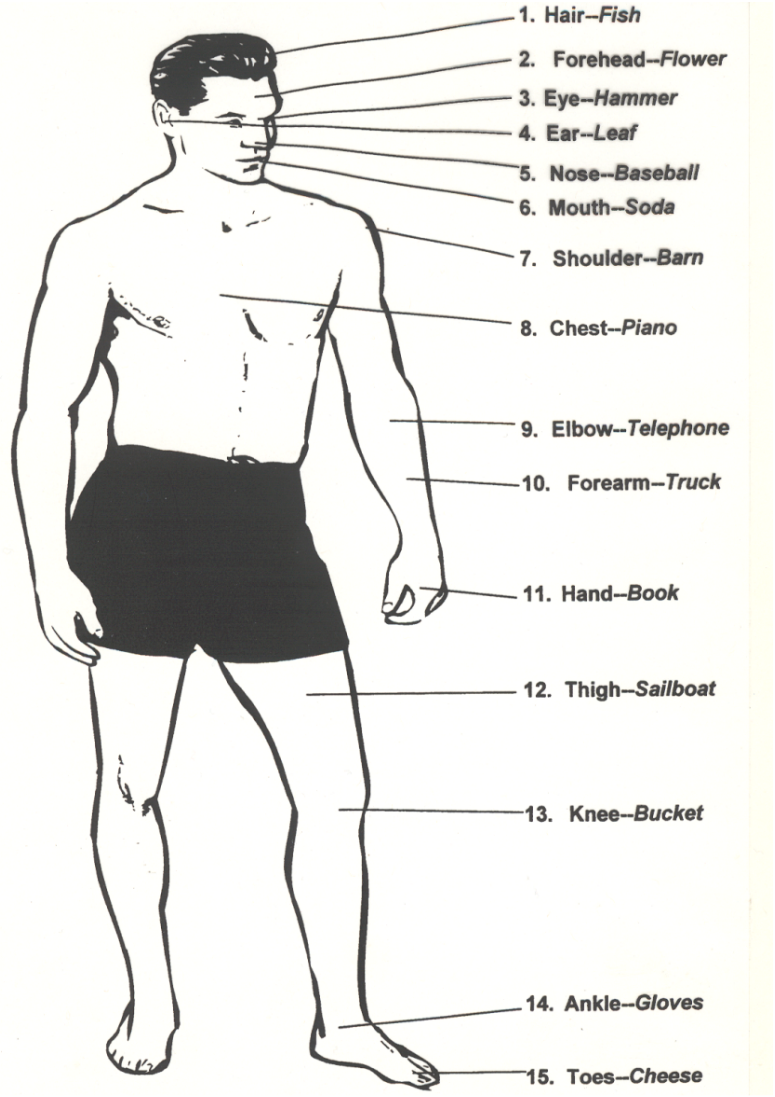
ACTIVE: Memory Training



Memory Man

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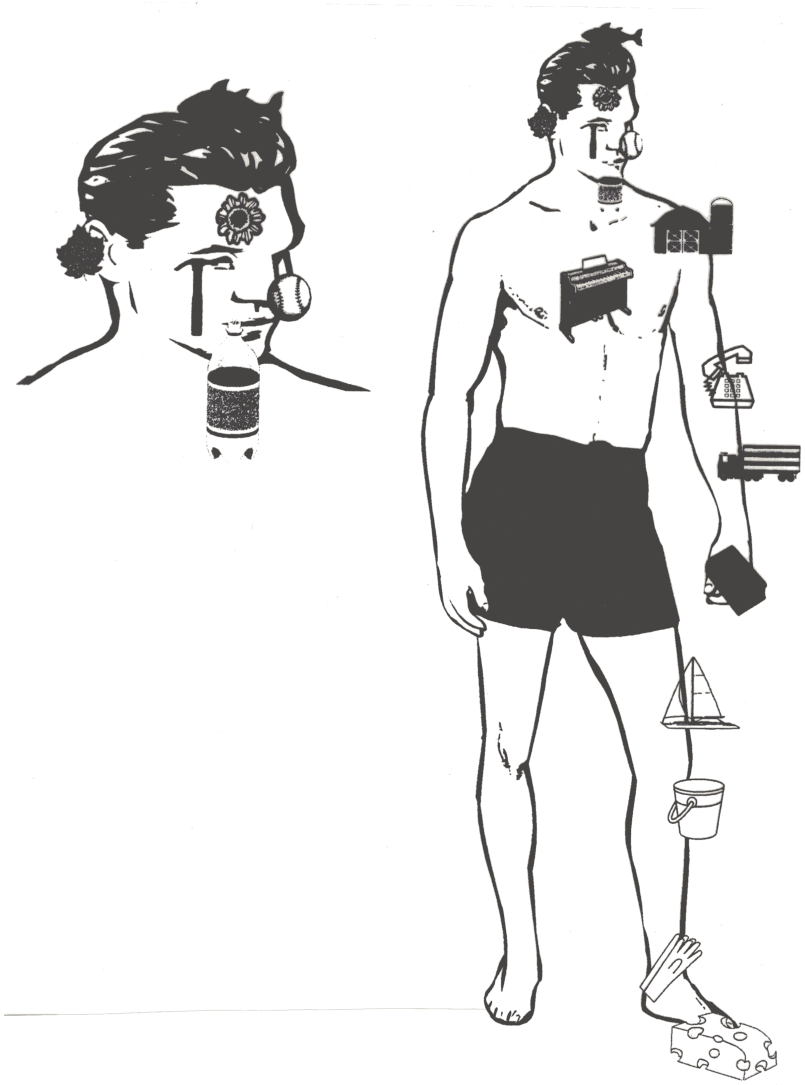
ACTIVE: Memory Training



Memory Man

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ACTIVE Reasoning: Finding the Pattern in Schedules

Sunday	Sunday
Sunday	Sunday
Monday	Monday
Tuesday	Tuesday
Tuesday	Tuesday
Wednesday	Wednesday
Thursday	Thursday
Thursday	Thursday
Friday	Friday

1. **Scan or look over** every word
2. **Underline** repeated words
3. **Say aloud** the schedule
4. **Make slashes** between repetitions

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Look at Mr. Jones' medication schedule. Fill in the calendar for one week. Put an A, B, or C in the calendar when he should take each medication. If he should take two pills of a certain medication at one time, put AA or BB. Below is a sample calendar:

Time Of Day	Sun	Mon	Tues	Wed	Thurs	Fri	Sat
Morning	AA B	AA B	AA B	AA B	AA B	AA B	AA B
Noon							
Evening	AA	AA	AA	AA	AA	AA	AA
Bedtime	C	C	C	C	C	C	C

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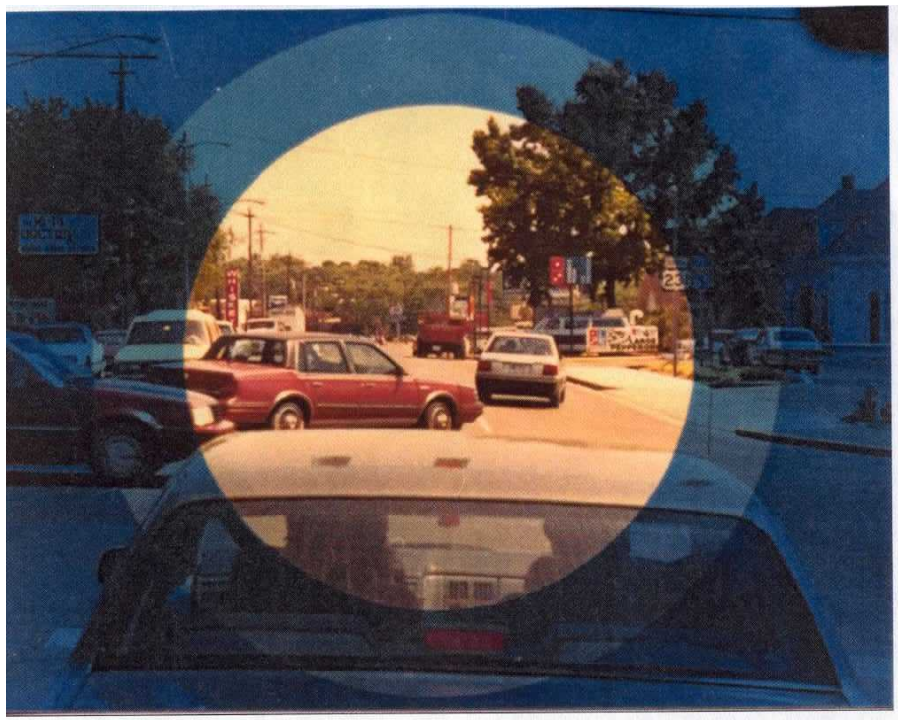
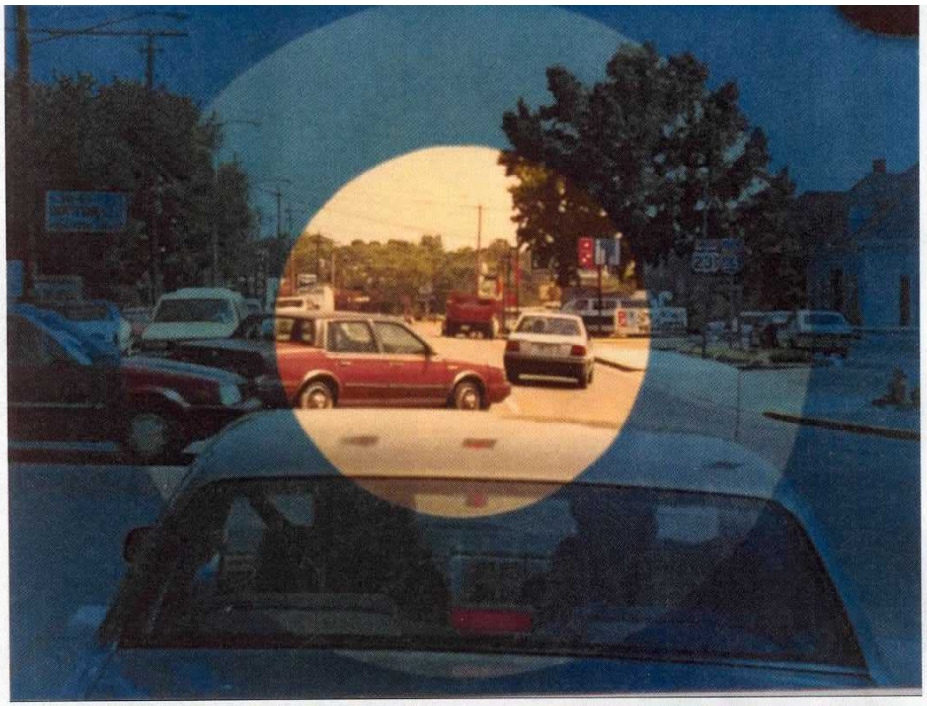
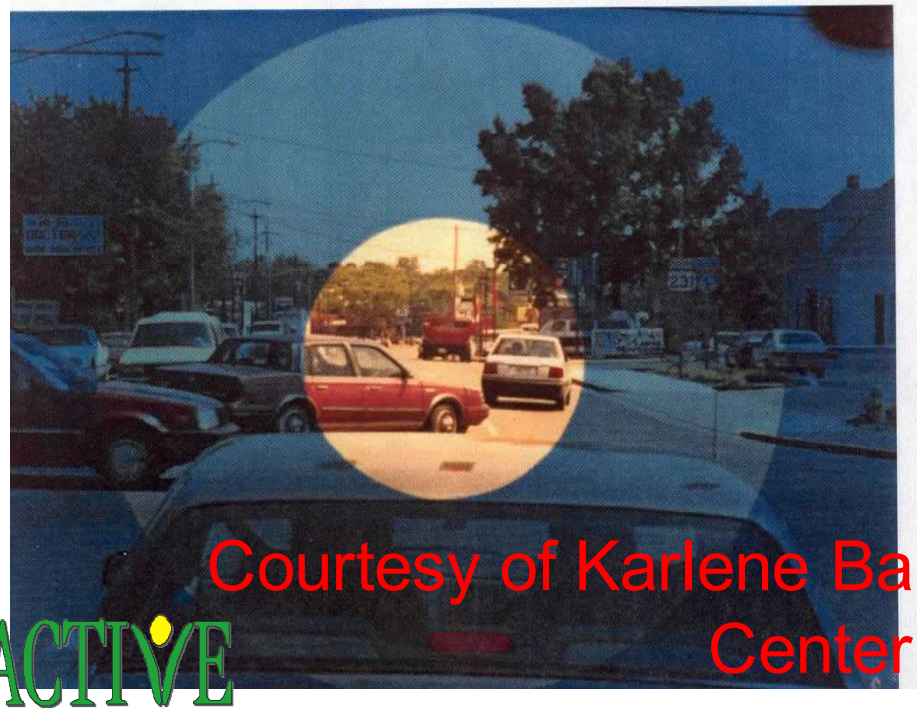
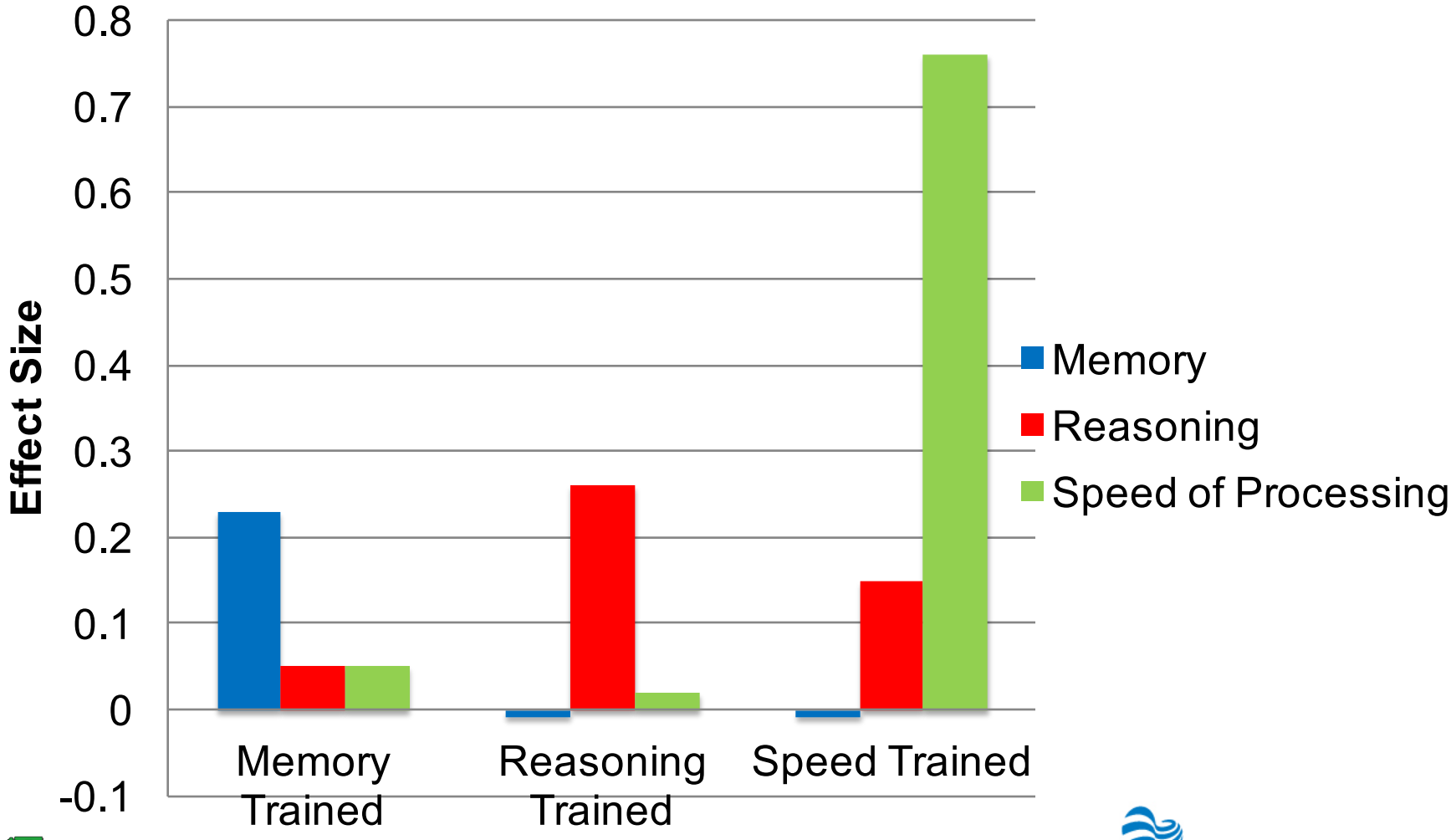





Courtesy of Karlene Ball, UAlabama Birmingham Roybal Center for Research Applied Gerontology

ACTIVE

ACTIVE 5 Year Results



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Willis et al, JAMA. 2006;296(23):2805-2814.

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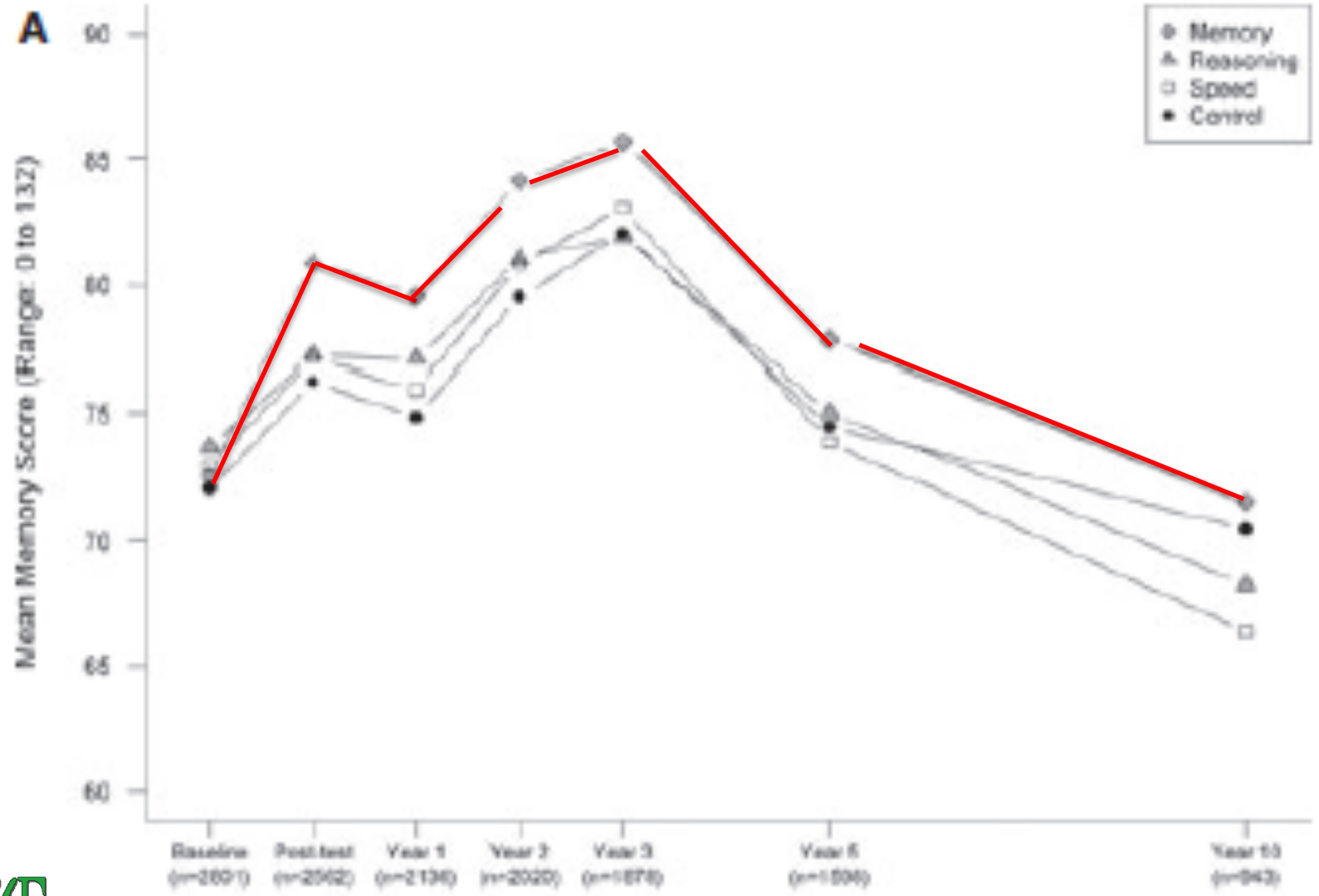
ACTIVE: 10 Year Results: Memory



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Rebok et al. JAGS 2014

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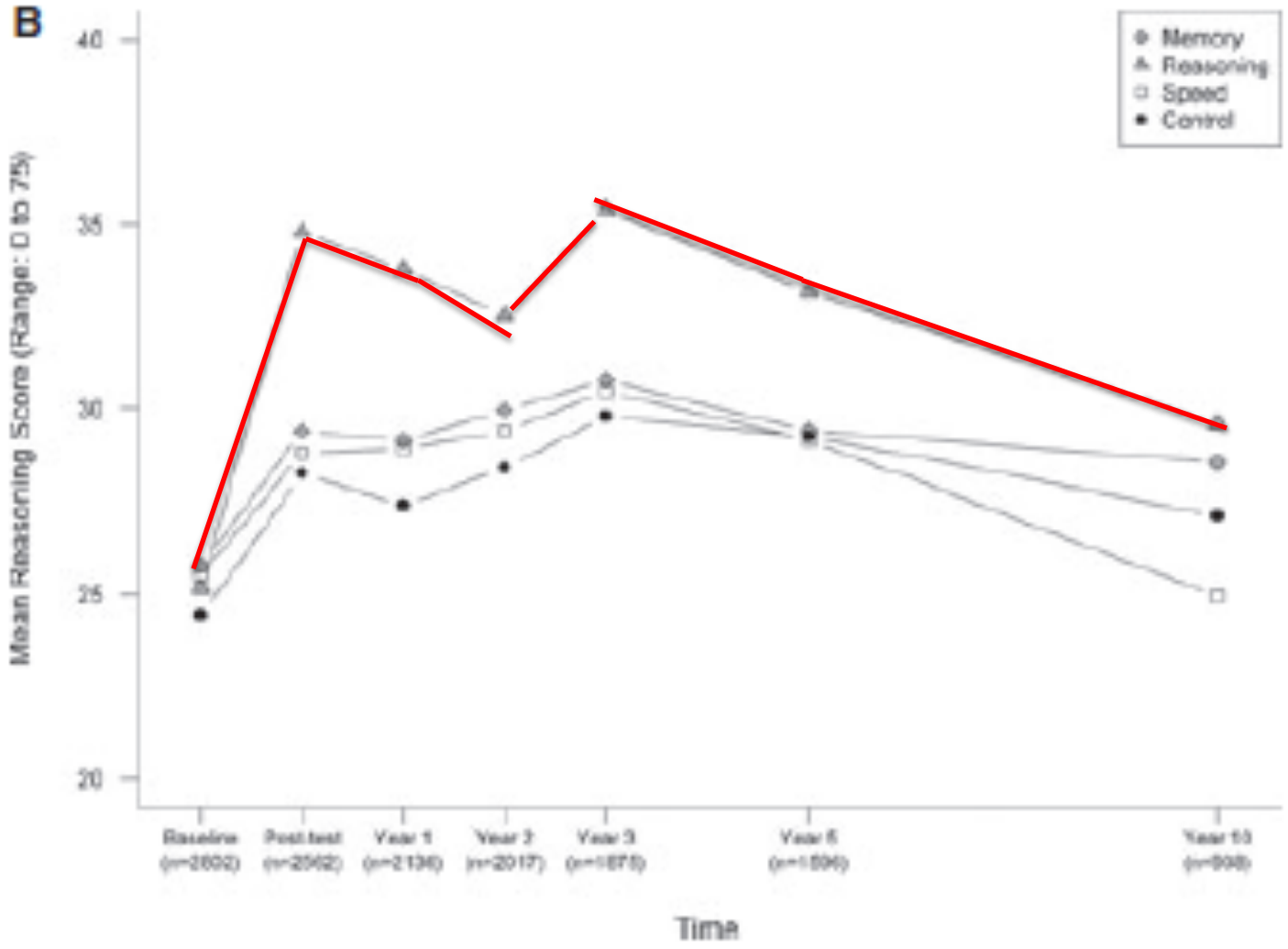
ACTIVE: 10 Year Results: Reasoning



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Rebok et al. JAGS 2014

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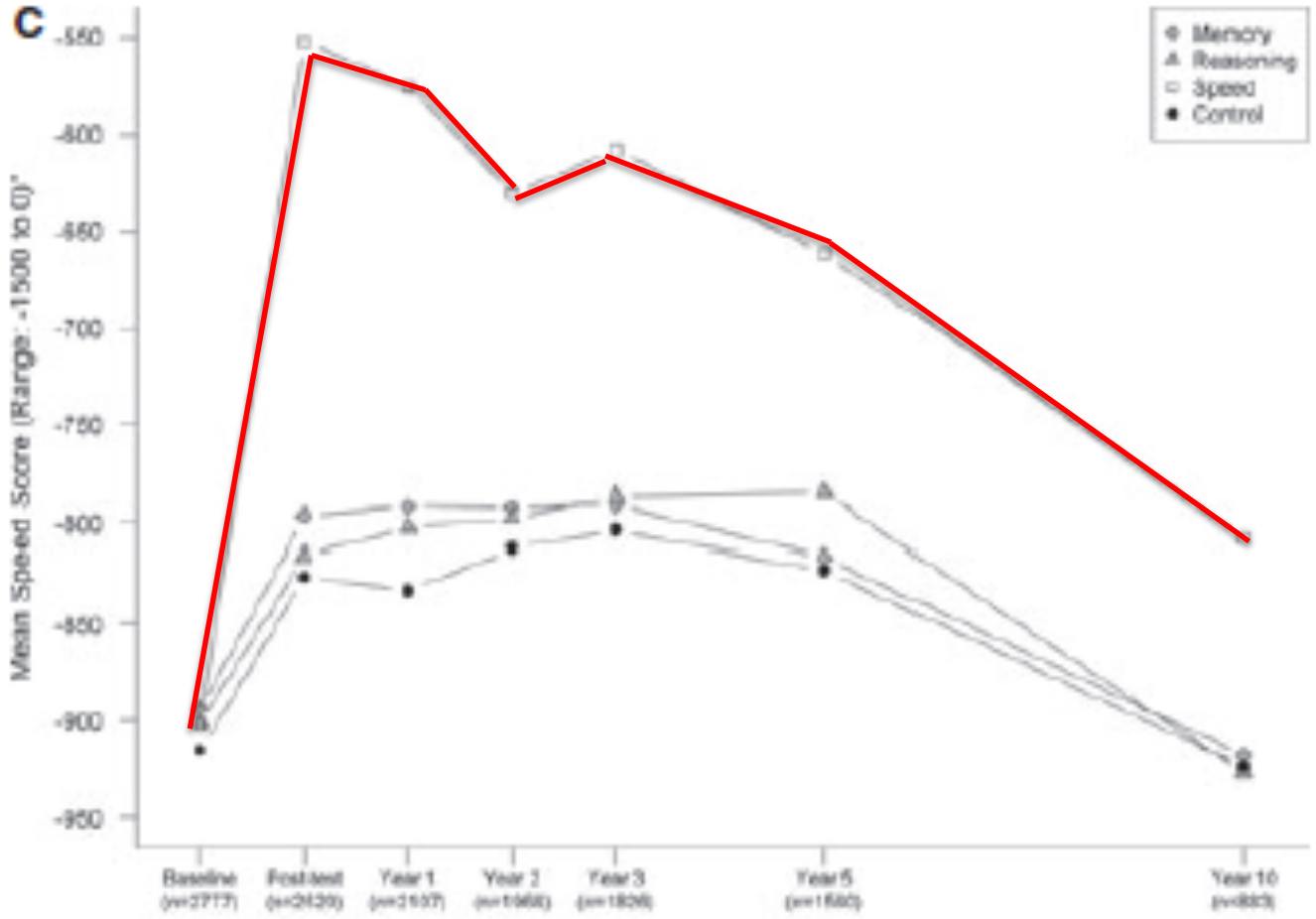
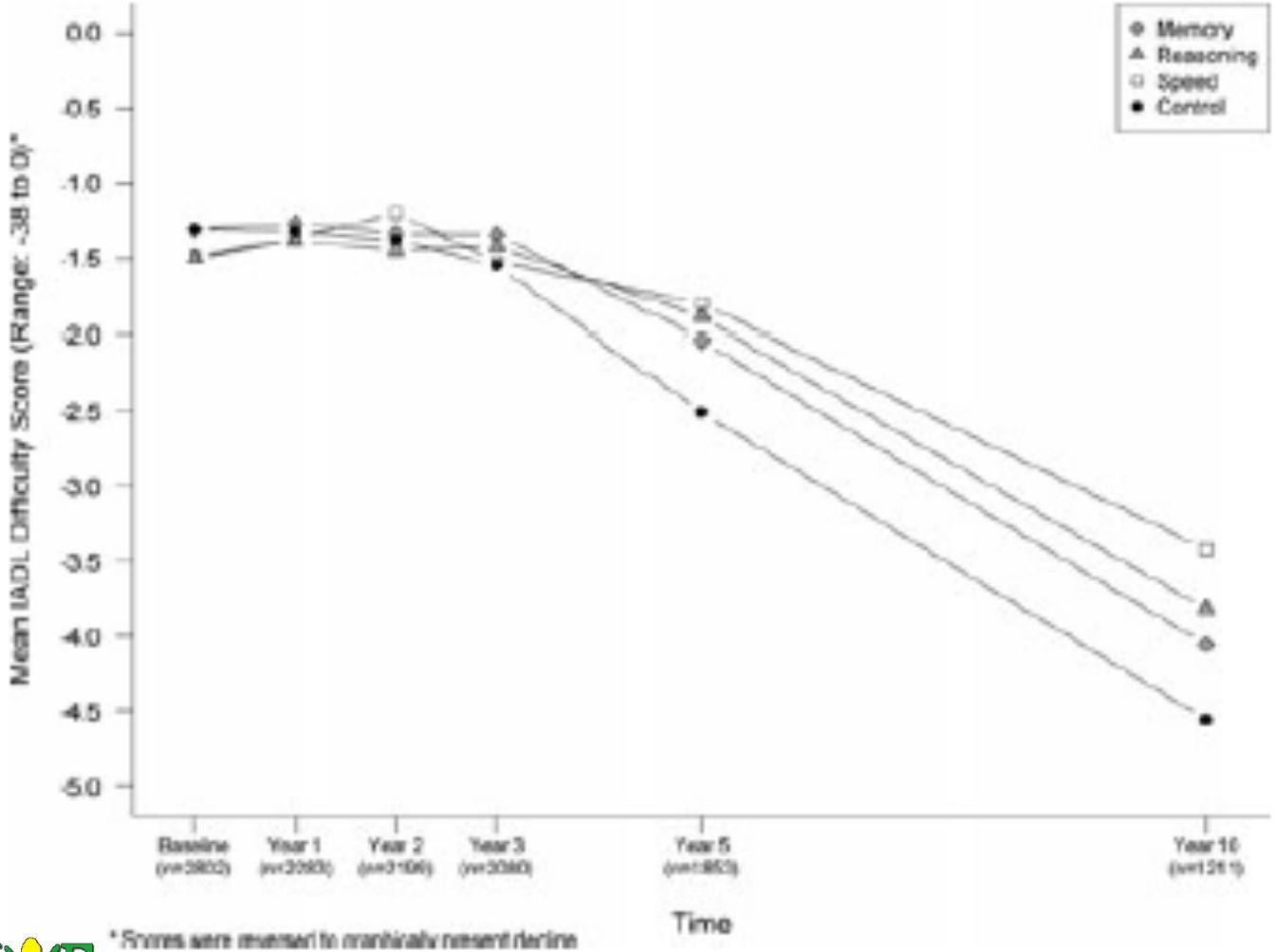
ACTIVE: 10 Year Results: Speed of Processing



Rebok et al. JAGS 2014

Impact on Everyday Activities



ACTIVE

Rebok et al. JAGS 2014

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ACTIVE Findings To Date

- Observable benefits 5-10 years after training
- Effects appear earliest for speed of processing participants
- Memory-impaired participants only benefited from speed of processing and reasoning training
- No subjective memory improvement
- Reduces age-related declines in health-related quality of life

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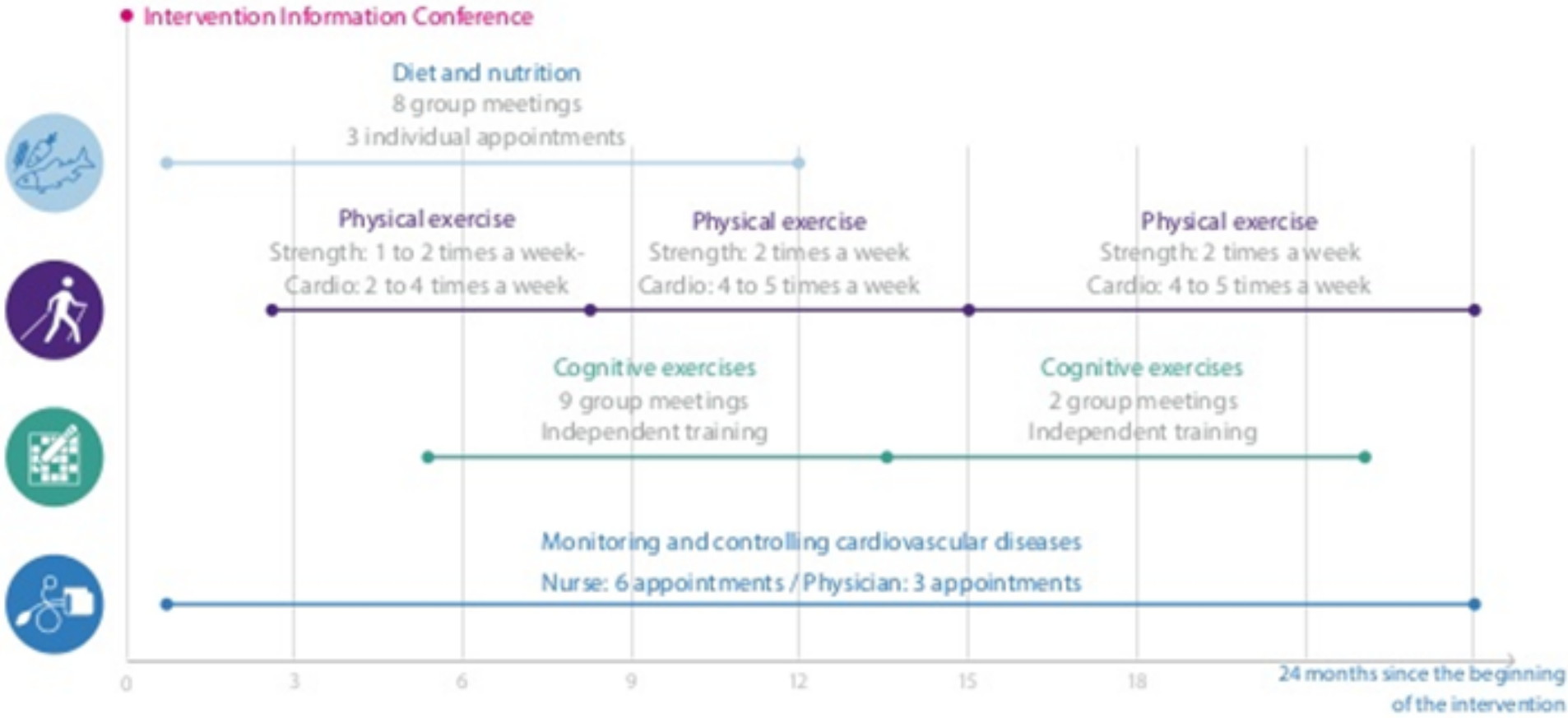
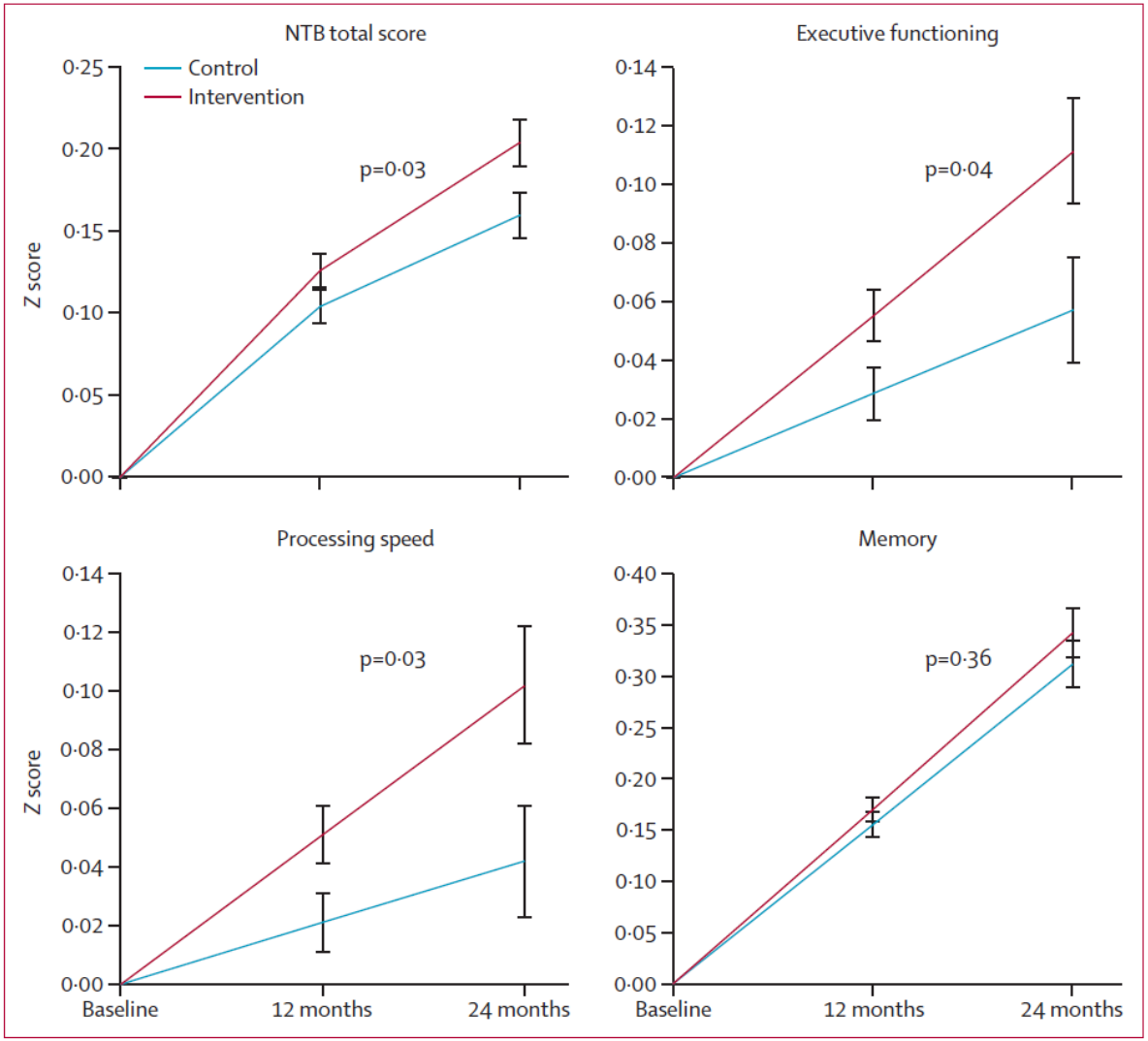
Finnish Geriatric Intervention Study to Prevent Cognitive Impairment and Disability (FINGER)



- To avoid overwhelming the participants, not all lifestyle changes were implemented at once.
- The level of difficulty of the physical and cognitive exercises was increased over the course of the study.
- Efforts were made throughout the study to improve the participants' diet.

FINGER Results: 2 Years



Ngandu et al. Lancet (2015)

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Novel Approach to Delaying Cognitive Decline

http://www.aarp.org/experience-corps/

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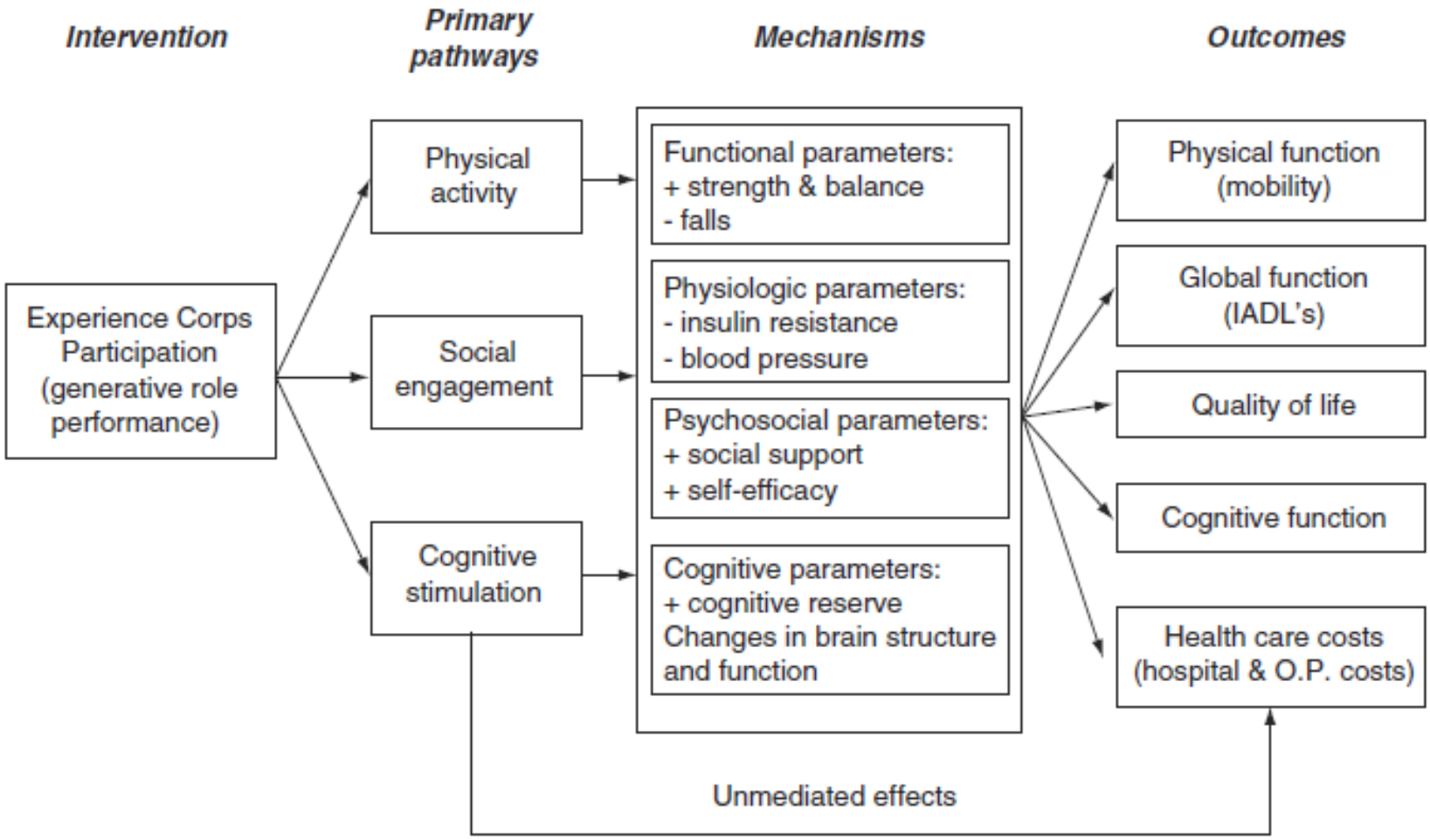
Experience Corps



Fried et al (2004) *J Urban Health*

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Experience Corps Participants

Variable	Intervention ($N = 70$)	Control ($N = 58$)
Age, *M* (*SD*)	70.1 (6.42)	68.4 (5.15)
Education (years), *M* (*SD*)	11.9 (2.54)	11.2 (2.66)
Baseline MMSE score, *M* (*SD*)	24.96 (3.45)	25.3 (2.60)
Annual income <$15,000, %	65	82
Black, %	94	95
Female, %	83	93
Married, %	24	28
Number of health conditions	2.6 (1.7)	2.6 (1.3)
Persons with health conditions diagnosed by a physician, %		
Myocardial infarction	6	0
Angina	11	10
Congestive heart failure	8	5
High blood pressure	68	73
Diabetes	30	24
Stroke	5	0
Arthritis of knees/hip	43	40
Arthritis of hands	26	41
Cancer	9	5

Carlson et al (2008) *Gerontologist*

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Experience Corps Results

Variable	Intervention		Control	
	Baseline	Follow-Up	Baseline	Follow-Up
Trail Making Test				
Part A (s)				
Impaired	95.2	56.5	90.2	55.2
Normal	56.3	51.1	55.0	56.8
Part B (s)				
Impaired	297.5	173.0	260.4	237.0
Normal	118.7	154.7	127.5	170.4*
Word list memory				
Immediate recall				
Impaired	19.3	20.9	21.6	19.6
Normal	21.4	19.9	20.7	21.3*
Delayed recall				
Impaired	5.0	7.0	6.4	5.6
Normal	5.9	5.6	6.3	6.6*
Rey-Osterrieth				
Copy score				
Impaired	18.4	17.8	16.5	15.2
Normal	20.0	17.8	19.9	17.9
Delayed recall				
Impaired	9.1	12.8	10.6	8.0
Normal	12.0	11.5	11.8	11.2

Note: *$p < .05$.

Carlson et al (2008) *Gerontologist*

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Experience Corps Findings

- Improved executive functioning and memory, particularly in participants with impaired executive functioning at start of program
- Improved social and physical activity (walking, stair climbing speed, strength) levels
- Short-term participation in community-based program focused on increasing cognitive & physical activity in a social, real-world setting may benefit abilities that are critical to functional independence

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Brain Fitness & Computer Games

- Handful of small studies with brief follow-up
- Minor, short-term improvements that do not transfer to other domains
- Do not improve to the same level as a “young” (20s) person
- Take home: they don’t hurt, but no evidence they help

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Summary

- Cognitive training may delay cognitive decline in healthy older adults
- Limited evidence of training benefits in older adults with cognitive impairment
- Do not know if training delays progression to MCI or dementia
- Real world training offers short-term benefit → more research is needed for long-term effects
- Multi-faceted approach provides benefits up to 2 years after intervention

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Thank you!

Questions?

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