Train Your Brain: An Evidenced Based and Holistic Approach to Optimal Brain Health

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Today's Session

- We will take a very holistic and interconnected approach, discussing a myriad of factors that affect cognition and brain health, as we age.
- This type of information is crucial for anyone who works with older adults, so we can help improve health literacy, and motivation among older adulst.
- Bottom line is that numerous behavioral and lifestyle interventions appear to have a significant impact on cognitive abilities and the likelihood of developing cognitive impairment and/or dementia.

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Neuropsychology has found that executive functioning is key

- Executive functioning includes:
  - Attention
  - Cognitive inhibition (controlling distractibility)
  - Behavioral (or response) inhibition
  - Problem solving
  - Reasoning
  - Planning
  - Working (or short-term) memory

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What do we know?

- What factors predict better brain health, memory ability or lower chances of developing dementia?

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Many controllable factors impact risks of cognitive impairment

- Physical exercise
- Cognitive stimulation
- Stress and neuroticism
- Sleep
- Social support and engagement
- Diabetes and insulin resistance
- Yoga
- Tai Chi
- High Intensity Interval Training (HIIT)
- Dance
- Dual tasking
- Mindfulness training and Meditation
- Alcohol
- Hearing impairments

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A 2022 Meta-Analysis of 44 Published Studies on the Effects of Online Cognitive Training

- Researchers combined data from 44 studies that used participants with mild cognitive impairment or early-stage dementia
- Results showed improvements in executive functioning (attention) and making new memories
- Results also showed reductions in depression
- Programs that lasted for at least 6 weeks had better results

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Article in the Journal *Neurology*

- Wilson et al. found that people who participated in more mentally stimulating activities had a slower rate of decline in memory. Mental activity accounted for nearly ***15 percent*** of the difference in decline beyond what is explained by brain changes associated with dementia.

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Meta-Analysis in *Neuropsychology*

- Karr et al. conducted a 46 study meta-analysis on the effects of cognitive training and/or physical exercise on cognitive abilities.
  - Both treatment modalities improved executive functioning
  - Reliable effect sizes

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A Multimodal Approach May Be Best

- Nishiguchi et al. reported that a 12-week program that combined physical and cognitive exercise yielded not only improvements in executive functioning performance (e.g., attention) but also led to more efficient brain activity (in the pre-frontal cortex) as measured by fMRI.

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Cognitive Stimulation

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Who benefits the most, in terms of cognition?

- Cognitive training
  - People with mild cognitive impairment and early stage dementia seem to benefit the most. People with more advanced dementia can see improvements to quality of life but probably not cognition.
  - Optimal session length 30-60 minutes, a few times a week, for at least 6 weeks.
  - It is easier to document improvements in older adults relative to middle aged and younger adults.

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Exercise and Cognition

- *Walking is the best possible exercise. Habituate yourself to walk very far.* Thomas Jefferson (1743–1826)
- Researchers have found a robust relationship between physical activity and cognitive ability. We will explore this relationship and a variety of types of exercise.

Stock image purchased by Rob Winningham

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Classic Study

- Colcombe and Kramer reported the results of an 18-study meta-analyses on the effects of exercise on cognition.
  - Age [Older (66-70 or 71-80) > Younger (55-65)]
  - Type of exercise (Aerobic + Strength > Aerobic)
  - Length (6+ months > 5 or less months)

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Exercise and Cognition

- Researchers have since found that physical exercise leads to improvement in executive functioning.
- There are short term benefits (same day and next) and long-term benefits that are seen after several months.

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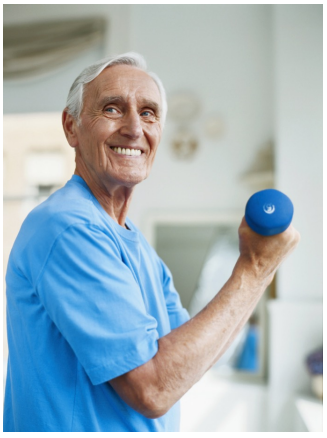
What type of exercise is best?

- Researchers reported that either once-a-week or twice-a-week **resistance training** sessions for 12 months led to improvements in older adults' cognition and attention.
  - 11% improvement for once-a-week
  - 13% improvement for twice-a-week



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Strength or Resistance Training

- Then, researchers found that twice a week resistance training in 70 to 80 year old women, with Mild Cognitive Impairment, led to significant improvement in attention and memory ability.

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Options for Resistance Training

- Body weight supported exercise
- Theraband
- Weights
- Water exercises

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Yoga can improve cognition

- In a meta-analysis that combined data from 15 studies assessing the effects of yoga on cognition. The improvements were significant and benefitted executive functioning.

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Why might Yoga help?

- Increased attention and focus
- Reduced stress
- Physical exercise (both resistance and aerobic)

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Tai Chi Can Benefit Mental and Physical Health

Public domain image:
https://commons.wikimedia.org/wiki/File:Tai_Chi,_Cannon_Beach.jpg

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Tai Chi

- Researchers combined data from 20 studies looking at the effects of Tai Chi on cognition and memory ability in older adults and concluded that Tai Chi has the potential to improve **executive functioning** Other researchers have shown executive functioning predicts ability to care for oneself and chance of falling.

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Dance

- Dancing has long been associated with cognitive improvements in older adults.
  - Executive functioning
  - Spatial ability
  - Social engagement
  - Often has dual tasking components

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Who benefits the most, in terms of cognition?

- Physical activity
  - Older adults tend to have greater improvements in cognition.
  - Resistance training seems to be one of the best physical exercises, in terms of cognition.
  - People with lower baseline physical fitness levels seem to experience the greatest improvements.

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Frequency, Intensity, Time and Type (FITT)

	Aerobic	Strength	Flexibility & Balance
Frequency	≥3 days per week, trend to ≥5 days per week *	≥2 days week	2 to 3 days per week
Intensity	Moderate to vigorous **	50% to 80% of 1RM ****	To point of light to mild tension
Time	≥150 minutes/week (moderate-intensity) ***	5 to 30 repetitions, 3 to 14 seconds/rep, 1 to 3 sets	10 to 40 seconds per stretch or position
Type	Rhythmic, continuous physical activity	Body & external weights; all muscle groups *****	Stretch, balance, yoga, all major muscle groups

From: http://www.healthedpartners.org/ceu/pa-healthyaging/

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Why the link between exercise and memory?

Physical activity may improve brain function through:

- Neurogenesis
- Synaptogenesis
- Brain Derived Neurotrophic Factors
- Angiogenesis (creation of new capillaries or blood vessels)
- Reduction in inflammation
- Improved sleep
- Mitigates insulin resistance

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Social Fitness and Loneliness

- Social engagement provides cognitive stimulation, buffers against depression, and can add meaning and purpose to one's life.
- In contrast, loneliness and social isolation are associated with numerous negative outcomes.

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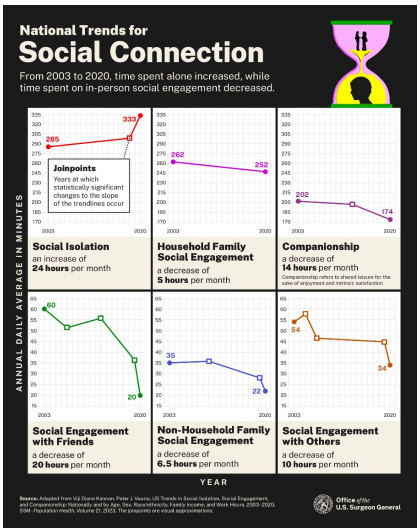

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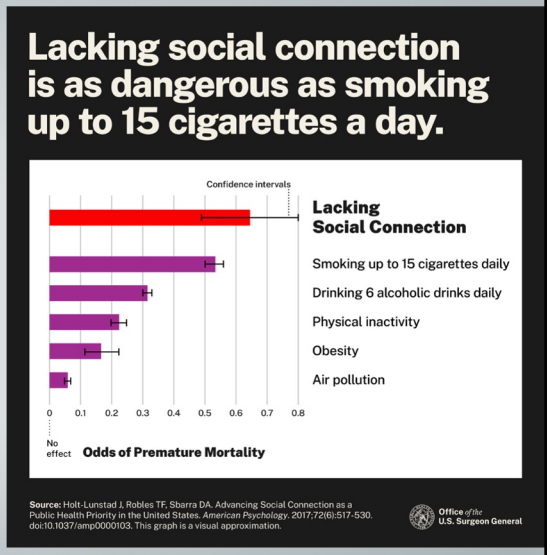
"The mortality impact of being socially disconnected is similar to that caused by smoking up to 15 cigarettes a day, and even greater than that associated with obesity and physical inactivity." Dr. Murthy



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Physical Health Impacts of Loneliness

Social isolation, poor social support networks and loneliness are associated with:

- 29% increase in heart disease
- 32% increase risk of stroke
- Increased risk of dying from a cardiovascular event
- Much poorer outcomes after a serious health event
- Increased risk of developing Type 2 diabetes
- Weaker immune system
- As much as 50% increase risk of developing dementia
- Increased likelihood of developing clinical depression and/or anxiety
- Increased risk of suicide

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Loneliness and Older Adults

- Are older adults and younger adults experiencing social isolation and loneliness in the same ways?
- Loneliness among older adults has increased since the start of the pandemic but that may not be as true for younger people.
- Younger adults may be fulfilling more social needs online (maybe that is why they are not getting drivers licenses at the rate seen decades ago)

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Why are we seeing such dramatic increases in loneliness and social isolation?

- A feedback loop: less social interaction leads to depression and social anxiety, which leads to less social interaction…
- Weakening institutions
  - Reduced church attendance and affiliation in the U.S.
  - Reduced participation in community and civic groups
- Increased geographical mobility
- Growing cultural and political polarization is fueling mistrust, isolation and intolerance

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Risk factors for loneliness or social isolation

- Sensory impairment
- Retirement
- Death of loved ones
- Worsening health conditions
- Depression
- Anxiety
- Lower income
- Living alone
- Divorce
- Cognitive impairment
- Discrimination
- Living in a rural area
- Lack of transportation
- Language barriers

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Nutrition

- Avoid ultra processed food and simple carbohydrates.
- Research has found a positive correlation between Omega-3 fatty acids levels (e.g., DHA) and cognitive functioning in older adults.
- The more fish people eat, the less likely they are to show signs of Alzheimer's Disease.
- Diabetes is a risk factor for dementia.

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Some research has shown these diets might reduce dementia risk

- **Mediterranean Diet:** Rich in fruits, vegetables, whole grains, legumes, and healthy fats (olive oil), with moderate fish consumption. It is recognized for reducing cardiovascular risks that contribute to dementia.
- **DASH Diet (Dietary Approaches to Stop Hypertension):** Focuses on low-sodium, nutrient-dense foods to reduce high blood pressure, which is a risk factor for cognitive decline and vascular dementia. Limit red meat, sweets, fried, and fast food.

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Summary

- Participation in cognitively stimulating activities is associated with decreased likelihood of developing dementia.
- Physical exercise and activity is critical and requires both strength and aerobic activity, in order to maximize brain health.
- Social and purposeful engagement are great for the brain and cognition.
- Our diet affects cardiovascular and dementia risk.
- Now we need to spread the word!

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Contact Information

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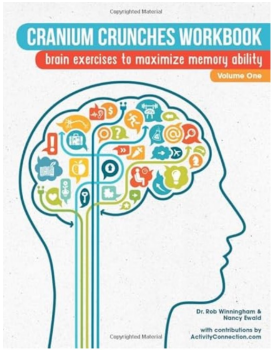

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