HEALTHY AGING

LINDSAY HINES, PHD
SANFORD HEALTH
FARGO, ND

SANFORD HEALTH

LEARNING OBJECTIVES

- Describe key factors that can aid in healthy brain aging.
- Understand reversible causes of memory decline in the aging population.
- Describe what medical conditions influence brain health in aging, and how to circumvent the negative effects of these conditions on brain health.

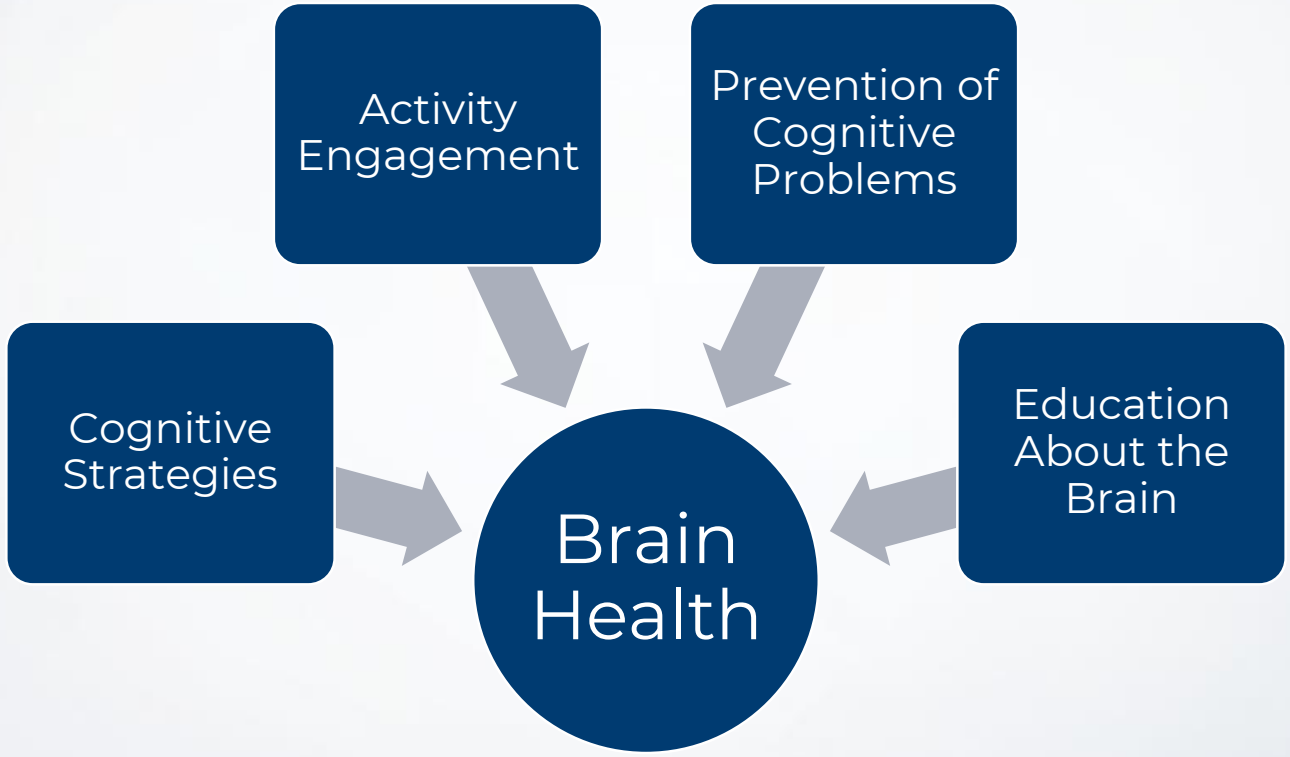
DISCLOSURES

- No Disclosures

BRAIN HEALTH

- For young and *aging* populations
- Normal Aging vs Clinical Decline
  - Recommendations are similar or the same
  - Early life implementation
  - Never too late

4 KEY DOMAINS OF BRAIN HEALTH



COGNITIVE STRATEGIES

- Techniques we use to enhance our ability to remember, organize, and manage information in daily life
  - External Strategies
  - Internal Strategies

EXTERNAL STRATEGIES

- Helpful in managing tasks in daily settings

- Cell phone reminders
- Calendars (physical or digital)
- Sticky notes
- Kitchen timer
- Pillbox
- Alarm clock
- Dry erase board

INTERNAL STRATEGIES

- Techniques we generate mentally to facilitate learning, recall, or other cognitive processing

- Verbalizing or “talking yourself through” a task
- Using acronyms
- Attach personal associations
- Taking a mental step back when stuck solving a problem
- “**Unitasking**,” not multitasking

ACTIVITY ENGAGEMENT

- Physical Activity
- Social Activity
- Intellectual Activity

PHYSICAL ACTIVITY

- The US Department of Health and Human Services and American Heart Association recommended at least 30 minutes of aerobic exercise activity 5 days per week and muscle strengthening 2+ days per week
  - Only 20% of adults achieve this

PHYSICAL ACTIVITY

- Exercise benefits brain structure and function in multiple ways
- Any type of exercise is good for the heart and brain, although most of the research to date on the brain/ exercise relationship examines the effects of casual or brisk walking.
- Exercising 20-30 minutes per day, even if we just take brisk walks, has a powerful impact on the brain
- Physical activity helps the brain work better for those with or without medical conditions and **reduces the risk of developing dementia** and other chronic health problems.

PHYSICAL ACTIVITY- DEMENTIA

- Exercise decreases the chance of developing Alzheimer's disease and other forms of dementia
  - Physical exercise is a "modifiable risk factor" that is associated with more cases of Alzheimer's disease in the US than any other factor we can potentially control (such as diabetes, obesity, smoking, and high blood pressure)
    - The risk gets progressively lower the more **types** of physical activity you engage in (i.e. engage in cross training, and your brain will reap the rewards!)
    - The research supporting the protective effects of exercise on dementia prevention is compelling

PHYSICAL ACTIVITY- HOW MUCH

- Exercising 75 minutes per week (about 10-15 minutes per day) leads to some brain and cognitive benefits.
- Exercising 150+ minutes per week (20-30 minutes per day) is even better for the brain and cognition.
- Moderately paced exercise (5-6 rating on a 0-10 scale of minimum to maximum exertion) seems particularly good for the brain, but high-intensity exercise can also be helpful
- Adding a social component helps

PHYSICAL ACTIVITY

- There is a **dose response relationship** with exercise.
  - Individuals who work out fairly regularly show better memory and language skills than those who never exercise.
  - The more physically active people are, the better they perform on cognitive tasks.
  - It’s never too late!
    - People that aren’t active at [the beginning of the study], but got moving later showed significant improvement in their thinking skills

PHYSICAL ACTIVITY- HOW MUCH

- Low intensity, every day walking influences brain size and functioning.
  - For every thousand steps walked per day, the hippocampus tends to be a little bit bigger. More exercise equaled a larger hippocampus (greater brain size related to memory).
- Other research found that walking 6-9 miles per week is linked to **greater volume** in multiple brain areas, especially the frontal lobe and temporal lobes (executive functioning, attention, memory).
  - Therefore, walking <u>about a mile a day</u> has measurable and significant effects on how much overall brain tissue you have at your disposal.

PHYSICAL ACTIVITY- WHAT KIND

- Yoga has been found to promote richer connections throughout the brain and improve memory
- Tai chi can enhance attention, memory, and language skill
- Aquarobics can improve working memory and some kinds of attention
- Cycling improves both verbal and visual memory, particularly right after a cycling session

PHYSICAL ACTIVITY- HOW IT WORKS

- Exercise reduces high blood pressure which in turn lessens the chances of sustaining small lesions in the brain.
- Individuals who exercise are at decreased risk of heart disease and diabetes.
- Exercise grows new neurons, and ramps up brain plasticity

PHYSICAL ACTIVITY- BRAIN GROWTH

- Hippocampus, frontal cortex
- Increased neurons -> learning, problem solving, processing speed, attention
  - In individuals that were previously sedentary, individuals that took up walking at least 3 days per week, for 40 minutes increased the size of the hippocampus (memory) at a rate that essentially erased the expected 1-2% decline in volume due to aging.
  - Individuals that walk, jog, or ride a bike for 30-60 minutes at a time, 3 days a week for 6 months have demonstrated significantly better thinking skills on a global level (including improved memory, processing speed, and executive function). There is a dose response relationship: The more one's fitness improved during the study, the bigger hippocampus got.

PHYSICAL ACTIVITY- BRAIN CHEMISTRY

- Brain Derived Neurotropic Factor (BDNF)
  - Single bouts of exercise boosts BDNF, and this increase is associated with improvement in multiple cognitive skills including memory and executive functioning.
  - A single bout of exercise impacts BDNF levels more positively in people who are physically fit.
  - People who exercise consistently have a higher concentration of the neurotrophin at rest.

PHYSICAL ACTIVITY- SITTING

- Sitting- getting up and moving around, even if for brief periods of time, really makes a difference for overall health and for brain health
  - excessive sitting during the day is linked to an increased likelihood of death after accounting for other causes
- The more hours per day spent sitting, the smaller your medial temporal lobe tends to be
  - The medial temporal lobe is important for learning and memory

EXERCISE AND INFLAMMATION

- Higher physical fitness and exercise levels reduce inflammation, and this reduction is associated with better cognitive functioning

SOCIAL ACTIVITY

- Social activity includes multiple cognitive demands
  - Pay attention to what the person is expressing verbally and nonverbally, mental juggling of conversation, consideration of the other person's perspective
- Phone, Zoom/Video counts as social activity
- Avoid isolation
  - Being socially isolated and lonely is toxic to overall health and, specifically, brain health
- Make a plan for engagement
  - Have a social partner
  - Establish a routine (every/ every other weekend)

SOCIAL ACTIVITY- FREQUENCY

- The frequency of our social activity, besides your social circle, and our sense of social support impacts cognitive skills and brain health.
- Conversely, social isolation and negative social interactions can be detrimental to your brain.

SOCIAL ACTIVITY- FREQUENCY

- Frequent social activity including with friends, family members, or coworkers is good for emotional and cognitive health.
- Social interactions that last at least 10 minutes have more powerful brain effects than shorter encounters; more social “doses” of this duration are better for the brain.
- Having a relatively large network of social connections is enriching for the brain and **reduces the risk of developing dementia.**

SOCIAL ACTIVITY- FREQUENCY & QUALITY

- If you don’t interact with many people at work, make sure you engage in plenty of social time at home and with friends.
- Feeling a sense of support from others in life has important emotional and brain related benefits.
- Consistent social activity may make up for less time exercising (if you have physical limitations and can’t exercise very much).
- When possible, avoid people who tend to put you in a negative emotional or psychological state.
- Volunteering in the community is associated with brain related benefits for the volunteer, including better executive functioning and memory, as well as more brain volume.

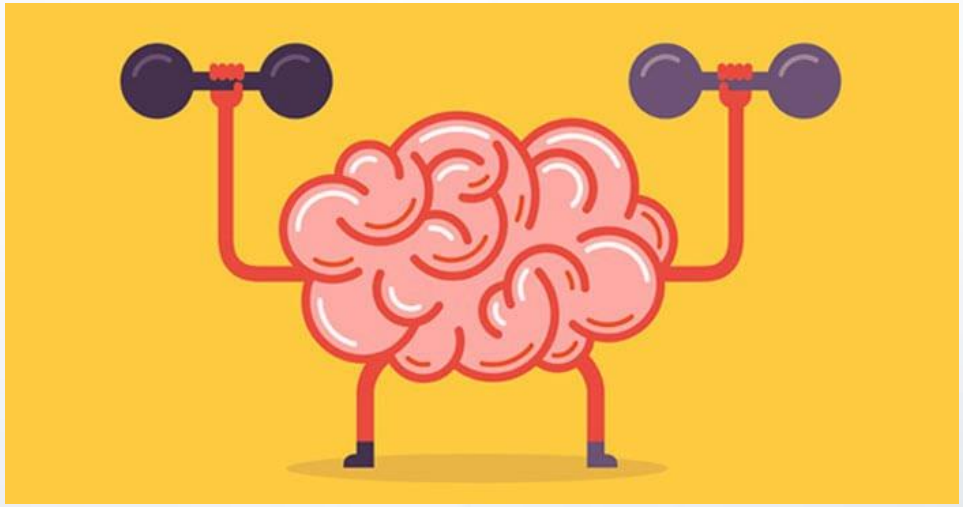
INTELLECTUAL ACTIVITY

- Reading
- Crossword Puzzles
- Playing musical instrument
- Going to museum
- School
- Volunteer activity

- People who are more involved in mental activities tend to show fewer cognitive changes in midlife and beyond, and are at decreased risk of developing dementia
- Consider multi-domain activities (tennis)

INTELLECTUAL ACTIVITY

- Midlife mental activity matters.
  - As with physical and social engagement in our 40s and 50s, mentally stimulating activities in midlife **reduces the chances of developing mild cognitive impairment or dementia** down the road.



MENTAL ACTIVITY- BRAIN TRAINING GAMES

- Research has repeatedly demonstrated that improvements in brain-training computer tasks do not yield real-world improvements in cognitive functioning or daily activities
  - Research indicates that people get better at the game they're introduced to- quite a bit better.
  - The skills that improve unspecific games don't boost cognitive performance in daily life.
  - A recent meta-analysis that examined more than 300 studies in this area found the same thing.

MENTAL ACTIVITY- KEY POINTS

- Taking on a hobby that is novel and challenging is particularly good for the brain.
- Participating in hobbies and other mentally stimulating activities in midlife appears to have a strong protective effect on the brain that lasts for decades and is associated with a **reduced risk of dementia**.
- Specific activities such as reading, doing crossword puzzles, playing games, photography, and playing a musical instrument are all associated with better cognitive health.

MENTAL ACTIVITY- KEY POINTS

- Engaging in a variety of different mentally stimulating activities might be better than frequently doing any one activity: think “mental cross training.”
- Any hobby participation is positive, but an hour or more per day has a particularly powerful and protective effect on the brain.
- Working in a complex and stimulating job, especially if you’re managing others, has brain enhancing benefits.

MENTAL ACTIVITY- KEY POINTS

- If you’re in a job that isn’t very stimulating, you can make up for this cognitively by pursuing mentally engaging hobbies.
- Research today indicates that improvement on computerized brain training games does not seem to result in cognitive gains in daily life.

PREVENTION OF COGNITIVE PROBLEMS

- Diet
- Managing stress
- Some medical conditions
- Smoking
- Sleep difficulties

DIET

- People who adhere to a Mediterranean style diet have brains that are more efficient at processing information and remembering new things
  - Fruits and vegetables, olive oil, certain types of nuts, beans, fish, and a little wine with little to no red meat or dairy products

Foods to Emphasize:

- Fruits, vegetables, olive oil, legumes, nuts/seeds, whole grains, herbs/spices, Water

Low to moderate amount of:

- Fish, white meat, eggs, yogurt, cheese, red wine

Avoid or minimize:

- Red meat, processed meat, other processed foods, high-fat dairy products, sugary foods, soda drinks

MEDITERRANEAN AND RELATED DIETARY STYLES

- Individuals who maintained a particularly healthy diet such as eating a lot of fruits, veggies, and whole grain demonstrated a **24% reduced risk of showing cognitive decline**
  - There were particular benefits of this healthy diet on ability to concentrate.
  - People who eat a healthy diet and exercise at least twice a week have an even lower risk of cognitive problems
- It is better to get brain healthy nutrients through one's diet rather than through supplements.
- No available over-the-counter nutritional supplements have consistently been found to improve cognitive skills.
  - A recent study that reviewed about 40 individual studies of various supplements was not encouraging.
  - Fortunately, there are plenty of other things we know of that are effective at promoting brain health, as discussed in this talk.

DIET

- A Mediterranean style diet seems to be the best nutritional choice for promoting brain health based on a number of studies.
- A Western diet, with emphasis on red meat, potatoes, and high-fat dairy products, is associated with weaker cognitive functioning.
- Combining a Mediterranean style diet or prudent diet with a Western diet reduces the risk of cognitive decline.
- A diet containing more fish than red meat is associated with better brain health.
- Across studies, foods that can enhance cognitive skills include fish, nuts, olive oil, fruits, and vegetables.

DIET

- Leafy green vegetables (spinach) and cruciferous vegetables (broccoli, kale, cauliflower) have been linked to slower cognitive decline during the aging process.
- Berries–particularly blueberries and strawberries–have been found in some studies to be protective against memory and general cognitive decline.
- Omega-3 fatty acids ingested through one's diet, rather than as supplements, have been associated with better cognitive functioning, larger brain volume, and reduced risk of dementia.

MANAGING STRESS

- Prevents problems with attention, memory, other thinking skills.
- Protects certain brain structures such as the hippocampus (memory) from potentially toxic hormones that are released when we feel chronically tense
- Stress interferes with the workings of the hippocampus, which can lead to problems learning new information or recalling something you already know.
- Stress affects the frontal lobes, which can translate into difficulties with working memory and flexible thinking.

MANAGING STRESS- MINDFULNESS

- Consistently engaging in mindfulness exercises can strengthen the brain, particularly the hippocampus and frontal lobes.
- Yoga practice can expand some brain regions and improve cognitive abilities like attention and processing speed.
- Regularly affirming your most important personal values can significantly reduce stress levels.
- Experiences that one person consider stressful may be enjoyable to others. What is stressful or enjoyable at one time in your life may be experienced very differently over time, or after practiced.

MEDICAL CONDITIONS- DIABETES

- Diabetes–type I or type II–is associated with multiple cognitive difficulties, including problems with memory, processing speed, and executive functioning.
- Diabetes can increase the risk of developing dementia.
  - Eating a Mediterranean style diet and exercising can prevent diabetes; both lifestyle choices can also reduce the impact of diabetes on the brain.

MEDICAL CONDITIONS

- Hypertension (high blood pressure) has been linked to mild cognitive impairment, dementia, and other cognitive challenges.
  - Reducing blood pressure through exercise and diet can improve general health and brain health
- Being overweight or obese can lead to mild cognitive difficulties, especially regarding the executive functions.
  - Reducing weight through diet or exercise can improve brain health.

MEDICAL CONDITIONS- SMOKING

- Smoking can increase dementia risk by 26%. Otherwise stated, millions of individuals worldwide could have potentially avoided Alzheimer's disease by not smoking.
- Smoking can diminish the size of multiple brain regions and impair memory, executive functioning, processing speed.
  - People who stop smoking show improvement in multiple cognitive skills over time.

SLEEP- SLEEP APNEA

- **Sleep apnea** can affect brain structure and cognitive function significantly, especially if it goes untreated
- Use of a CPAP device to treat sleep apnea can lead to cognitive improvement
  - Poor sleep (due to SA) the night before results in slower processing speed, weaker attention, and diminished memory.
  - It is believed that various hypoxic episodes caused by obstructive sleep apnea result in lasting damage to the brain.
  - Untreated obstructive sleep apnea has been found to shrink the hippocampus and have negative effects on other structures such as the amygdala, thalamus, and frontal lobes.

SLEEP

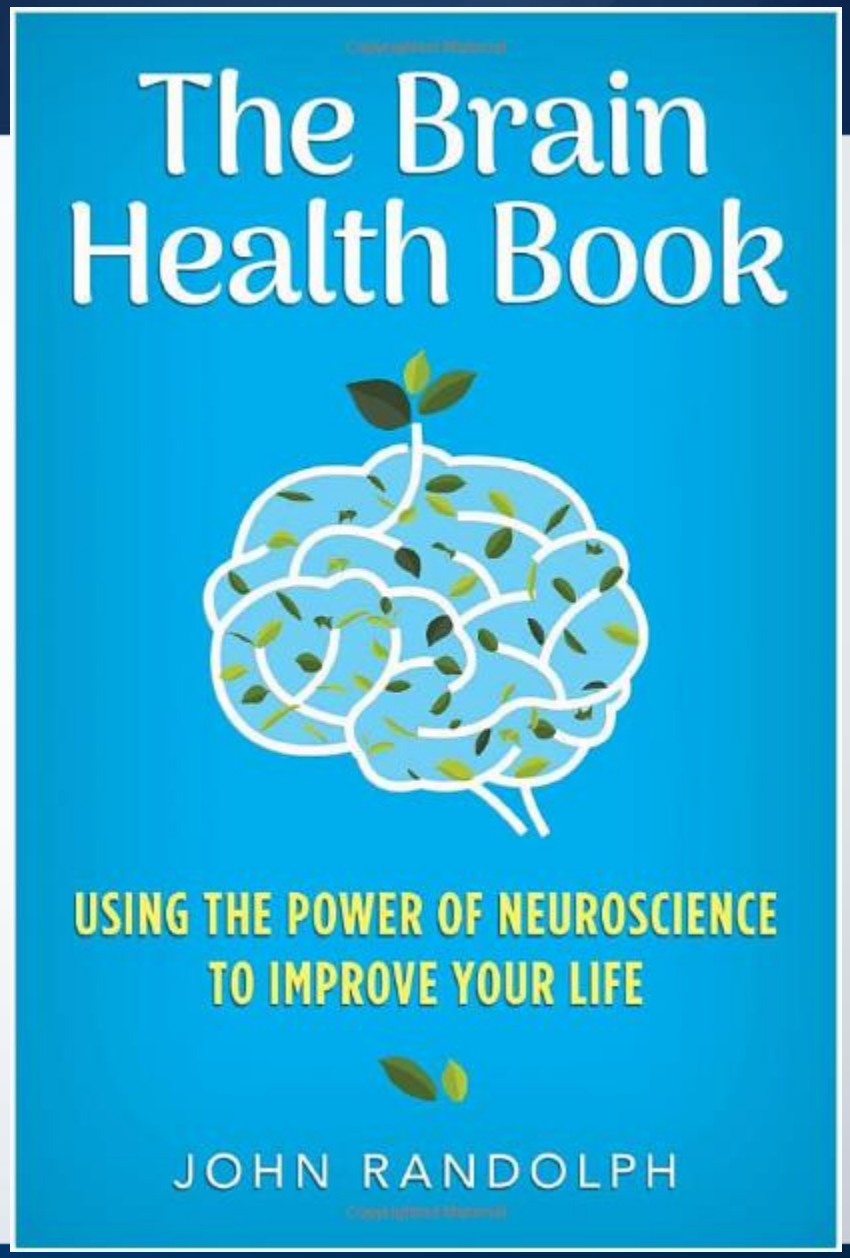
- The ideal window for sleep duration for most people is 7-8 hours per night.
- Sleeping less than 6 hours per night is associated with multiple cognitive problems, including reduced attention, working memory, and processing speed.
- Sleeping more than 9 hours per night can also cause cognitive difficulties.
- Short sleeping during the workweek and long sleeping to “catch up” on the weekend is risky from a cognitive standpoint.

SLEEP

- Sleep hygiene strategies, such as avoiding caffeine in the afternoon, not watching TV or other screens in bed, doing something relaxing before bed, and having consistent sleep-wake times, can help promote healthy and satisfying sleep.
- Expressing gratitude and having a clear sense of purpose in life can positively affect sleep quality.
- Naps less than 30 minutes, particularly in the afternoon, can enhance cognitive abilities such as working memory, learning, and memory consolidation.

EDUCATION ABOUT THE BRAIN

- That's what we are doing today
- Knowledge that "memory problems" can occur due to many causes such as increased stress, anxiety, or depression, poor sleep



SUMMARY

- Accommodate
  - Use strategies
- Stay Active
  - Mental and physical
- Eat Healthy
- Monitor Health
  - Physical and mental
- Reduce Stress
- Sleep well