The Human Brain
Center of all of our thoughts, feelings, passions and dreams, decisions, and actions

Brain Plasticity
(ability of the brain to reshape itself throughout life)

Approximately 1 billion neurons and 1 trillion neural connections
Brain and Mind

Determinants of Successful Aging of the Brain

- Genetics
  - 15-30% determinant
- Physical & social environment
- Lifestyle choices
- Psychological factors
  - Mind/Brain Interactions
- Relationships

Factors for successful aging:
- Physical Activity
- Social Interaction
- Mental Stimulation
- Diet
- Adequate Sleep
- Stress Management
Brain Plasticity and Exercise
- develop new brain neurons (neurogenesis) especially in hippocampus dentate gyrus
- develop new and better brain connections (neuroplasticity) especially in pre-frontal cortex and hippocampus
- improve blood flow within the brain
- increase levels of essential neurotransmitters, such as serotonin & dopamine
- increase levels brain-derived neurotrophic factor (BDNF), and insulin-like growth factor 1(IGF1).

Physical activity helps to
- improve blood flow within the brain
- increase levels of essential neurotransmitters, such as serotonin & dopamine
- increase levels brain-derived neurotrophic factor (BDNF), and insulin-like growth factor 1(IGF1).

Exercise Improves Cognition
- Concentration
- Processing speed
- Planning, problem solving/ decision making
- Verbal fluency - the ease with which a person can produce words
Exercise Improves Cognition

- Multitasking
- Sensory-motor performance
- Various types of memory skills

Exercise Improves Intelligence

- Fluid Intelligence (abstract reasoning)
  - draws on the ability to understand relationships between various concepts (new & novel tasks)
  - relies on working-memory
  - affected more by the aging process
- Crystallized Intelligence
  - ability to use skills, knowledge, and experience to respond to environment

Fibromyalgia, Physical and Cognitive Performance

- Better physical performance predicts cognitive performance

  **Physical Performance Measures**
  - dynamic balance
  - aerobic endurance
  - gait cadence/velocity

  **Cognitive Performance Measures**
  - attention/executive function
  - processing speed
  - inhibition (stopping or overriding of a mental process)

Fibromyalgia Research and Education Center
http://hhd.fullerton.edu/cca/Affiliated/affiliated_fibro.htm
Exercise Improves Brain Function

STUDY 1
• Walking 3 times/wk for 45-minutes, for 6 months
• FMRI revealed increased activity in the frontal and parietal regions of brain for walking group but not stretch and tone

  • Frontal Lobe
    • Associated with reasoning, planning, parts of speech, movement, emotions, problem solving, decision making
  • Parietal Lobe
    • Associated with movement, orientation, recognition, perception of stimuli

Exercise Improves Brain Function

STUDY 2
• Aerobic exercise (moderate intensity)
• Significant increase in gray matter volume in frontal and superior temporal lobe of brain
  Kramer, et al, 2006

• Temporal lobe responsible for organization of sensory input
  • Very important for multitasking
Exercise dose needed to enhance cognitive performance

- At least 120 minutes of moderate exercise and 60 minutes of vigorous exercise /week
  Singh-Manoux, et al., 2005

- At least 142 min/week (approx. 20 min per day) of moderate aerobic activity
  Lautenschlager, et al., 2008

- At least 30-45 minutes of aerobic exercise between 3 and 5 days /week
  - Increase in frequency of exercise associated with increase in cognitive performance
  Masley, Roetzheim, & Guatieri, 2009
  Cherry & Jones, 2009

Exercise dose needed to enhance cognitive performance

Resistance Exercise
- 24 weeks @ 3 times/week
- Exercises: chest press, leg press, vertical traction, abdominal crunch, leg curl, and lower back
- 3 groups: control, moderate intensity (50%), high intensity (80%)
- Major finding: moderate and high intensity had equally beneficial effects on cognition.
  Cassilhas, et al., 2007

Summary:
How much is needed to improve cognitive?
- 120-150 minutes/per week of aerobic exercise
- Strength conditions 3 times/week
Alzheimer’s & Physical Activity Level

**Study 1:** 6 Year follow-up of 158 older adults
- Alzheimer’s disease significantly higher in people who reported exercising less than 3 times/week for 30 minutes
  Larson et al., 2006

**Study 2:** 5.4 year follow-up of 3,375 older adults
- Alzheimer’s disease significantly higher in people who reported exercising less than 3 times/week for 30 min.
  (Only a significant relationship for individuals NOT carrying apoE gene)
  Podewils et al., 2005

Physical Activity and Brain Health

- Challenging/novel
- Complex movements
- Moving various part of body
- Focused attention on what you are doing
- Engages the “thinking process”
- Fun
Brain Sensitizing

- When you move your body, many areas of your brain are stimulated.

Brain Sensitizing Exercises

Brain Wave Vibration

Brain Versatilizing

- Your brain is never too old to adapt.
- Be flexible in your body and mind.
Brain Versatilizing Exercises

- Tap & Sweep
- Thumb & Pinkie

Brain Versatilizing Exercises

- Opposite Shoulder Rotation

Brain Versatilizing Exercises

- Spiral Dance
Healthy mind/brain function is key to successful aging

- It takes a healthy mind/brain to be kind to ourselves and others – and to reach our full potential.

Language of Healing

**Grit, Gratitude, Grace**

Grit (Can do Spirit)

- Optimism
- Courage
- Bravery
- Perseverance
- Hardiness
- Determination
Gratitude
- Thankfulness
- Appreciation
- Generosity
- Acceptance

“What we do for ourselves dies with us. What we do for others and the world remains and is immortal.”

by Albert Pike

Grace
- Love
- Compassionate
- Tolerance
- Empathy
- Humility
- Hope
- Forgiveness
- Patience
- Spirituality
Share your love --human touch

- Basic need at any age
- Helps to boost immune system
- Improves brain function
- Nurtures the heart and soul

References

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- Colcombe & Kramer, Psychol Sci, 2003
- Cherry, Weiss, Baraket, Rutledge & Jones, Arch of Physical Med and Rehab, 2009
- Kramer & Erickson, Science, Science Direct, 2007