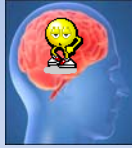


Physical Activity: A Key Factor for Healthy Aging of Brain

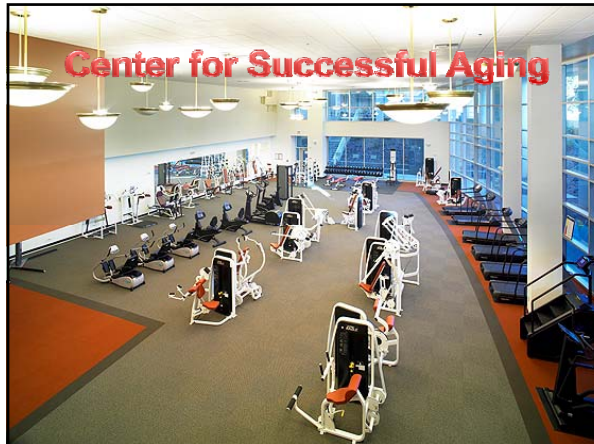


C. Jessie Jones, PhD
Professor Kinesiology and Health Science
California State University, Fullerton
2011 Active Aging Seminar
Hong Kong Baptist University

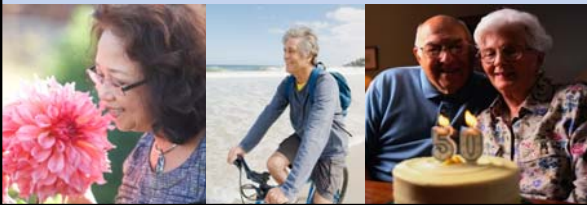


California State University, Fullerton
Departments of
Kinesiology and Health Science






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





Physical Activity



Social Interaction



Mental Stimulation



Diet



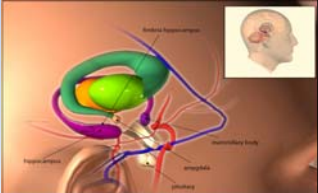
Adequate Sleep



Stress Management

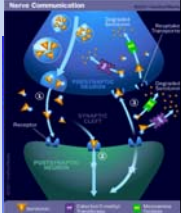
Brain Plasticity and Exercise

- develop new brain neurons (neurogenesis)
 - especially in hippocampus dentate gyrus
- develop new and better brain connections (neuroplasticity)
 - especially in pre-frontal cortex and hippocampus




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/csa/Affiliated/affiliated_fibro.htm

How much exercise Is needed






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

Colcombe et al (Proc Natl Acad Sci USA 101: 3316-3321, 2004)

- 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, & Gualtieri, 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




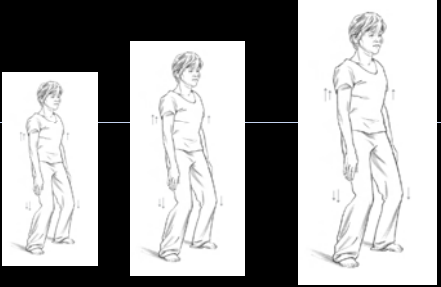


Brain Sensitizing

- 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





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