DID YOU KNOW...?

• Less than 5% of adults participate in 30 minutes of physical activity each day
• The American College of Sports Medicine recommends adults exercise 150 minutes per week in multiple intervals
• Exercise induces the production of brain cells in areas dedicated to memory and learning!
• Alzheimer’s Disease is the sixth leading cause of death in the U.S.
OVERVIEW

• **Aging** in the brain
  • Structures of the brain
  • Alzheimer’s disease

• **Physical** and **mental** effects of exercise on the brain
  • More brain cells
  • Memory improvement

• What kind of exercise should we **participate** in?
  • Effective forms of exercise
  • Intensity of exercise
These structures are seen to decay with aging 😞.
ALZHEIMER’S DISEASE

DIFFERENCES
- Volume reduction
- Ventricle enlargement
- Color
- Cognitive decline
PHYSICAL EFFECTS OF EXERCISE

• Prevents hippocampal deterioration (Smith et al., 2014)
• Increases cell survival (van Praag et al., 1999a)
• Creates positive effects on cognition
van Praag, Kempermann and Gage (1999)

- Animal study Mice
  - Learner: Water-maze
  - Swimmer: Forced to swim (involuntary exercise)
  - Runner: Allowed to run (voluntary exercise)
  - Enriched: Large bi-level cages, tubes, social interactions
  - Control: No altered condition

Runners showed improvement in hippocampus!
  - Double the amount of newborn cells (neurogenesis)
  - Higher amount of cell survival (cellular retention)
Figure 1 BrdU-positive cell number one day after last injection (a) BrdU-positive cell number 4 weeks after the last injection (b) (van Praag et al., 1999a)

This could mean better memory and learning ability!
HUMAN PHYSICAL EVIDENCE

- Smith et al. (2014)
  - Age range: 65 to 89 years
  - N = 97
  - MRI @ Baseline → 18-month follow-up
  - Conditions
    - High risk/Low PA
    - High risk/High PA
    - Low risk/Low PA
    - Low risk/High PA

Hippocampal volume decreased by 3% in High risk/Low PA group!
More cells = better cognition
Follow-up by Colcombe et al. (2006)

59 older adults
  • Ages 60-79

Random assignment to either:
  • Aerobic exercise program
  • Non-aerobic stretching and toning program

Three sessions for 1 hour per week
  • 6 month period
Aerobic exercise had increases in brain volume:

- **Prefrontal cortex**
  - Impulse control
  - General intelligence
- **Temporal lobe**
  - Effective long-term memory
- **Anterior white matter** tracts
  - Communication between brain hemispheres

These regions play key roles in successful everyday functioning! Larger brain volume = more cells = better cognition.
Geda et al. (2010)
- 1,126 participants without mild cognitive decline
- 198 participants with mild cognitive decline

Age range
- 70-89

Moderate exercise decreased risk of mild cognitive decline
- Bicycling, hiking, yoga, brisk walking, moderate use of exercise machines

The American College of Sports Medicine recommends that adults perform moderate exercise at least 150 minutes per week
UNORTHODOX PHYSICAL ACTIVITY

According to Best (2013)...  

EXERGAMING

An emerging type of video-gaming that replaces traditional button-pressing with body movements

Nintendo Wii U  
Xbox Kinect

https://www.youtube.com/watch?v=imecLkxRGiE
EXERCISE TO TRAIN YOUR B.R.A.I.N.

- Behavior
- Retention
- Attention
- Intelligence
- Neuroplasticity
Aging causes natural structural and mental decline
  • Functional deficits
  • This decline could possibly be delayed with exercise!

Exercise has physical benefits that help us mentally
  • Increases hippocampal volume
  • Increases prefrontal cortex volume
  • Increases temporal lobe volume

We should take part in exercising!
  • Aerobics works well
  • Moderate is better: 150mins/wk
REFERENCES


THANK YOU FOR COMING!

QUESTIONS?