ABLE Bodies: Concepts, Activities & Equipment for Balance & Cognition in Older Adults

By Sue Scott, MS
@OHCA 09/13/2011

ACTIVITIES & EQUIPMENT TO BOLSTER BALANCE & COGNITION

Q: CAN EXERCISE CHANGE OUR BRAIN?
AGLE Bodies: Concepts, Activities & Equipment for Balance & Cognition in Older Adults

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Yes!

RENEWABLE FITNESS & ABLE BODIES . . . . IMAGINE THE POSSIBILITIES

ABLE BODIES
Adventures in Better Living through Exercise

ABLE BODIES BALANCE TRAINING

More than 150 activities for better balance, mobility, and fitness

Sue Scott
ABLE BODIES

Comprehensive/Multi-modal

• Flexibility
• Posture
• Strength
• Balance
• Endurance
• Fun & Engaging

RENEWABLE FITNESS & ABLE BODIES . . . . IMAGINE THE POSSIBILITIES
CONCEPTUAL ACTIVITIES

The Ball Game

Venus De Milo Arms

Belly Button Training

Follow the Light

Puddle Jumping
SENSORY MOTOR ENRICHMENT

Five Senses

SENSORY SYSTEMS

• Vestibular
• Visual
• Somatic

INTEGRATED BALANCE SKILLS

• Automatic Balance
• Agility Training
Can brain-based exercise delay disability in PD? HELP PD???

- Basal Ganglia
- What it does for a living?
- Smooth intentional movement

BRAIN-BASED

Can brain-based exercise delay disability in PD? HELP PD???
HELP PD
Parkinson’s disease
• Basal Ganglia
• Neuro-degenerative
• Loss of dopamine

“ALWAYS-ON” FEEDBACK LOOPS
Basal ganglia, cerebellum, cortex, sensory systems
“Automatic”-ness of balance
• Keep our balance
• Postural stability
• Movement selection
HELP PD

Brain Based Agility Training
Neuro protection
Neuro-Plasticity
Neuro-Genesis

HELP PD
BRAIN-BASED AGILITY PROGRAM

Ex Strategies
BIG, Flowing, Sequential
Self initiated, paced
Planning, quickness, change
Strengthen extensors, trunk rotation
Develop body awareness
Build endurance
Obstacles & difficult tasks
Multiple directions, Dual tasks
COGNITIVE HEALTH COACHING PROJECT

Five Intervention Arms
- Brain Training
- Exercise
- Relaxation & Sleep
- Medication
- Socialization

Health Coaches

RENEWABLE FITNESS & ABLE BODIES . . . IMAGINE THE POSSIBILITIES

GOOD BRAIN HEALTH
Mental Stimulation
Physical Activity
Spirituality/Meditation
Socialization
Nutrition

Renewable Fitness & Able Bodies . . . ImAGIne the possibilitIes
NUTRITION

Brain is very metabolically active
3% of our BW

Blood passes through brain first
25% glucose & O2

WHAT BRAIN CHANGES MAKE US SMARTER?

Cognitive Capacity requires
Vascular changes – angio-genic, angio-plastic
Neural protection - glial cells, blood flow, O2, nourishment
Brain growth neurochemicals – BDNF, EGF1
More synapses – neural plasticity
More neuro-transmitters – GABA, dopamine
More neurons –neurogenesis
Greater efficiency

A year of exercise can give a 70 year old the brain connectivity of a 30 year old, improving memory, planning and dealing with ambiguity and multitasking. Art Kramer
BEST EXERCISE FOR COGNITION

What kinds work best?
Aerobic exercise has strongest research

Emerging research
- Complexity and interest make exercise more productive
  - Enriched environments
  - Challenging
  - Mental stimulation
  - Functional
  - Motivational/Spiritual? - connect w/emotions/motivations

Attention is magic sauce of brain change

RATS!!

Treadmill Running – Aerobic vs: Dopamine
- More neural transmitter
- Better motor function

Balance/Agility vs: Aerobic
- Larger improvements in motor function
- More new synapses, neurons
HUMAN STUDIES

“Fitness training provides skills that are more generalizable than specifically training memory or decision making.”

Art Kramer, University of Illinois at Urbana-Champaign

- Anatomic – structural changes
- Molecular – chemical changes
- Physiological – functional changes

ENVIRONMENTAL ENRICHMENT

Elicit natural explorative behavior

Tempt to explore their space
- Novelty, color, texture, lines, corners
- Connect w/ environment
- Manipulate environment – see exercise toys
- Challenges, problem solving, games
- Purposeful
- Promote socialization, fun
- Functional
ENRICHED ENVIRONMENTS

**Vision**
- Colors, Texture, Size, Change

**Somatic**
- Touch, pressure, position, vibration
- Stretching, Tai Chi

**Vestibular**
- Uneven/compliant surfaces; head movement

**Hearing**
- Rhythm, Music
- Stories

ENRICHED ENVIRONMENTS

**Smell**
**Taste**
**Imagination**
**Humor**
**Play**
**Toys**
**Change**
**Challenge**
**Emotion**
**Mission**
EE: ENGAGE / MANIPULATE SENSES

EE: THE ONE WITH THE MOST TOYS WINS
EE: AGILITY & OBSTACLE COURSES

OTHER TOYS & TOOLS

RENEWABLE FITNESS & ABLE BODIES...IMAGINE THE POSSIBILITIES
WII, XBOX KINECT GAMES

MAYA FIT

Interactive
Personalized
Fun and engaging
Progressive
Environment changes
Exercises change
Novel, modern, cool
Motivating – great tracking, progress reports
Mind body – motion-enabled gesture recognition
World-wide access with internet
Being developed for rehab and older adults
ACTIVITIES THAT TRANSFER COGNITIVE SKILLS

Exercise  Meditation  Video Games

MEDITATION: NEURO-THEOLOGY

“Down time”  Relaxation  Spirituality
Turn Inward  Slow down

Deep Breathing  Pray / Meditate
Progressive Relaxation  Attend worship
Journal anxieties & Give to others
problem solve  Create “your time”
Enjoy nature  Enjoy a pet

RENEWABLE FITNESS & ABLE BODIES . . . . IMAGINE THE POSSIBILITIES
What is the effect of exercise on learning, memory and cognition? This newest research area in the Suzuki lab asks how exercise affects learning memory and cognition. Suzuki’s first study focused on the effect of exercise on college students in her undergraduate elective course called “Can Exercise Change Your Brain?” We found that a semester of increased aerobic exercise improved performance on a recognition memory task compared to a control class that did not participate in the same exercise regime during the semester. In another study, we found that an hour of aerobic exercise improved cognitive performance in college students on a number of tasks dependent on the frontal lobe. A third study asks if increased aerobic exercise can enhance learning memory, cognition, and possibly recovery, in a population of drug addicts. While these initial studies have focused on defining the benefits of exercise at the behavioral level, our long-term goal is to understand the specific brain mechanisms underlying the changes in learning, memory and cognition we see as a function of exercise. To address this goal, future studies will focus on functional magnetic resonance brain imaging approaches.
PROMOTING NEURO RELAXATION

Via Exercise

• Tai chi
• Dahn Yoga
• Brain Wave
• Pilates
• Inten Sati

Other ways

• Spas
• Laughter
• Journal/stories
• Art
• Gardens
• Animal therapy
• Church services
• Family
• ...?

YOUR BRAIN ON MUSIC

When we listen to music, it's processed in many different areas of our brain. The extent of the brain's involvement was scarcely imagined until the early nineties, when functional brain imaging became possible. The major computational centres include:

- **CORPUS CALLOSUM**
  - Connects left and right hemispheres.

- **MOTOR CORTEX**
  - Movement, foot tapping, dancing, and playing an instrument.

- **PREFRONTAL CORTEX**
  - Creation of expectations, violation and satisfaction of expectations.

- **NUCLEUS ACCUMBENS**
  - Emotional reactions to music.

- **AMYGDALA**
  - Emotional reactions to music.

- **SENSORY CORTEX**
  - Tactile feedback from playing an instrument and dancing.

- **AUDITORY CORTEX**
  - The first stages of listening to sounds. The perception and analysis of tones.

- **HIPPOCAMPUS**
  - Memory for music, musical experiences and contexts.

- **VISUAL CORTEX**
  - Reading music, looking at a performer's or one's own movements.

- **CEREBELLUM**
  - Movement such as foot tapping, dancing, and playing an instrument. Also involved in emotional reactions to music.

*Source: This is Your Brain on Music: The Science of a Human Obsession*
SHAKE RATTLE AND [SOCIAL] ROLE OF MUSIC

IT’S NOT EXERCISE BRAIN-BASED VIDEO GAMES

Sharp Brains
Space Fortress
- Art Kramer, Univ of Ill at U-C
- Yaakot Stern, Columbia U
<table>
<thead>
<tr>
<th>Program Comparisons</th>
<th>Posit Science</th>
<th>Brain Age</th>
<th>Lumosity</th>
<th>CogniFit</th>
<th>Daki</th>
<th>My Brain Trainer</th>
</tr>
</thead>
<tbody>
<tr>
<td>How many scientific advisors in relevant fields does the company have?</td>
<td>33</td>
<td>0</td>
<td>8</td>
<td>5</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>Are scientists actively involved in day-to-day product development and testing?</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>How many studies have been published on the company’s technologies?</td>
<td>35</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Have benefits been shown to generalize (extend beyond the directly trained skills)?</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>What specific benefits have published studies shown?</td>
<td>See below</td>
<td>None</td>
<td>None</td>
<td>See below</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>

**BRAIN-BASED VIDEO GAMES**

**Best Choices**

- **Attention**
- **Focus**
- **Require change**
- **Progressive difficulty**
- **Executive function**

How a person plans a strategic approach to a task, controls what is attended to and how he or she manages the mind in the process.

Hertzog, et al, Scientific American Mind 2009

The brain changes both structure and function in response to stimulation and attention. Attention is the “magic sauce” for altering our brains.
MIND GAMES
XBOX KINECT / BOOKS

ACTIVE, CONNECTED, ENGAGED

RENEWABLE FITNESS & ABLE BODIES . . . . IMAGINE THE POSSIBILITIES
NEURONS THAT FIRE TOGETHER
WIRE TOGETHER

Dance/ Music/ Rhythm/ Inten Sati
Aerobic
Mind and Body
   Adds some spirituality, memories
   Some goal, some soul!
Challenge, Change , learning memory
   Attention, Focus
Sensory Motor, Agility, Sequential
Fun, Meaningful
Social

Physical Activities
that fit the bill

RENEWABLE FITNESS & ABLE BODIES . . . . IMAGINE THE POSSIBILITIES

BETTER BRAINS & BALANCE
“Neurobics”
Combine Aerobic & Balance

• Aerobic
• Interact with environment
  • Flexible
  • Functional
  • Interesting, challenging
• Connects Mind & Body
  • Motivating, enjoyable, meaningful
  • Somatic
  • Rhythm/Music

RENEWABLE FITNESS & ABLE BODIES . . . . IMAGINE THE POSSIBILITIES
AGING ACTIVELY MATTERS

Physical fitness helps us stay cognitively robust
Exercise reliably induces neurogenesis and other processes that enhance cognition
Prevent diseases that compromise cognition
Physical & mental acuity are mutually beneficial

NOW IT’S YOUR TURN

go on without me
BEST CHOICES

Invest in Front-line staff; be involved in research

- Leverage - small investment – big return
- Down payment - appreciates whole property
- Training leaders affects whole community

Opportunities to Explore their Profession

Inspires and elevate
- Conferences – adds sociability
- Balance and Agility Training
- Tai Chi
- Inten Sati
- Wellness Coaching – results will empower your residents

GOOD BOOKS

ABLE BODIES BALANCE TRAINING

SENIOR FITNESS TEST MANUAL

PRESCRIPTIVE STRETCHING

ATTENTION AND MOTOR SKILL LEARNING

RENEWABLE FITNESS & ABLE BODIES . . . IMAGINE THE POSSIBILITIES
**TALL SIT**

Improve posture and balance; strengthen back

- Eyes open/closed
- Head turns
- Lift/move arms
- Change foot position
- Lift knee
- Balance disc/ball
**TEETER TOTTER CHAIR STANDS**

Strengthen legs & Improve vital ADL

- Lean Back
- Lean Forward
- Stand Up!

**SIDE STEPS**

Develop lateral hip strength & stability
Reduce fall risk

**Chapter 6**
Strength for a Purpose

**Chapter 6 & 7**
Strength & Balance

Available in Able Bodies Balance Training, page 113
HEEL RAISES

Strengthen legs; improve gait & mobility

THANK YOU FOR COMING!

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Book: ABLE Bodies Balance Training
Human Kinetics, 2008

Consulting
Writing
Staff training
Personal & group training
Classes
Research
WHAT’S THE BEST EXERCISE?

The one they’ll do!