

Session 6300: Exercise: The Ultimate Brain Booster and Stress Reducer

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I. Health Benefits of Exercise: Kravitz, L. (2007). The 25 most significant health benefits of physical activity and exercise. *IDEA Fitness Journal*, 4(9), 54-63.

Reduced stress, depression and anxiety, lowered risk of stroke, lowered incidence of breast cancer in women, reduced (when elevated) blood pressure, increased function and mobility with less pain in arthritis sufferers, improved total cholesterol and LDL-cholesterol (aerobic exercise combined with weight loss), enhanced cardioprotection of cardiovascular disease, improved body composition and obesity management, maintained and/or increase bone mineral density for osteoporosis management, improved musculoskeletal health and prevention of sarcopenia, improved blood triglycerides and HDL-cholesterol (independently improved with aerobic exercise), lower incidence in colon cancer, better management and prevent of diabetes, enhanced self-esteem and mood state

Kravitz, L. (2010). Exercise & the Brain: It will make you want to work out. *IDEA Fitness Journal*, 7(2), 18-19.

II. Basic terms

- A. Cognitive function: the process of thought
- B. Mild cognitive impairment (MCI): person has problems with memory, language or other mental function: does not interfere with daily life
- C. Intelligence quotient: IQ, which is a measure of intelligence
- D. Cognitive reserve: mind's resilience to neurological damage
- E. Neuroplasticity: ability of brain to change structure and function (at any age)
- F. Dementia: general term for loss of memory & IQ abilities: interferes with daily life
- G. More on 'cognition': brain's processing ability to obtain knowledge via thought & the senses; research on cognition attempts to determine how we transform events & experiences into stored memory

III. Exercise and brain health: Children (4-18 years). Sibley B.A. and Etnier J.L. (2003). The relationship between physical activity and cognition in children: a meta- analysis. *Pediatric Exercise Science*, 15:243-256.

- A. Increase in math tests, academic readiness, intelligence quotient, verbal skills, achievement in overall academics and an increase in perceptual skills (like playing tennis)
- B. Great news is that the increased cognitive health as a child (from exercise) extends into adulthood

IV. Exercise and high school students: Field, T., Diego, M., and Sanders, C.E. (2001). Exercise is positively related to adolescents' relationships and academics. *Adolescence*, 36(141), 105-110.

A. Doing exercise and/or sports participation ~7 hours/week results in higher grades, better parental relations, less drug use

V. How does exercise improve brain function and cognition in youth? van Praag, H. (2009). Exercise and the brain: something to chew on. *Trends in Neuroscience*, 32(5), 283-290.

- A. Increase in cognitive reserve (mind's resilience to neurological damage)
- B. Greater cortical development; cerebral cortex is involved in information processing and language

VI. Exercise and brain health in adults

- A. Not much research with young adults
- B. Most research done with 'VP' populations: vintage persons
- C. Yaffee et al. (2001). A prospective study of physical activity and cognitive decline in elderly women: women who walk. *Archives of Internal Medicine*, 161(14), 1703-1708.
 - 1. 6-year study with 5,925 women (≥ 65 years of age)
 - 2. The more physically active women had the least cognitive decline
- D. Kramer et al. (2006). Exercise, cognition, and the aging brain. *J of Applied Physiology*, 101, 1237-1242.
 - 1. For adult men and women, exercise imparts a neuroprotective effect on the brain

2. It BOOSTS brain health and cognitive functioning
3. Executive central command improvements include the following from exercise; Increase in working memory, planning ability, scheduling ability, multitasking ability and increase in dealing with doubt; enhancement in how a person manages all tasks in her/his life

VII. What type of exercise program is best to improve cognitive function? Kramer et al. study

- A. Aerobic exercise, resistance training and flexibility combined
- B. The combined training programs encourages a broad range of brain neural and chemical adaptations
- C. Mechanisms for exercise for brain health. van Praag, H. (2009). Exercise and the brain: something to chew on. *Trends in Neuroscience*, 32(5), 283-290.
 1. New cell generation in hippocampus; area for learning and memory
 2. Increase in neurotransmitters; chemical messengers
 3. Increase in brain vessels: better oxygen circulation in brain
- D. Wang, Sam. 'Welcome to your Brain'. Research clearly shows that interventions that are good for cardiovascular health such as aerobic conditioning are good for brain health...confirming the Ancient Greek Philosophy, 'A sound mind in a sound body'
- E. Marcus Cicero, "It is exercise alone that supports the spirits and keeps the mind in vigor". John Adams, "Exercise invigorates and enlivens all the faculties of body and mind...It spreads a gladness and a satisfaction over our minds and qualifies us for every sort of business, and every sort of pleasure."

VIII. Resistance training improves mental health. Ramirez, A. & Kravitz, L. (2012). Resistance training improves mental health. *IDEA Fitness Journal*, 9(1), 20-22.

- A. Improved memory, improved self-esteem, less anxiety, improved cognition, improved quality of sleep, much less chronic fatigue, may lessen depression, improved executive control. Four studies have shown that resistance exercise is very effective in reducing the effects of depression in clinically diagnosed depressed adults.

IX. PTSD & Exercise: Cohen, B. E. et al. (2009). Posttraumatic stress disorder and health-related quality of life in patients with coronary heart disease: findings from the Heart and Soul Study. *Archives of General Psychiatry*, 66(11), 1214-1220.

- A. Anxiety disorder triggered by traumatic event
- B. Who may be affected? People who have experienced personal assaults, childhood abuse, natural disasters, accidents, life-threatening illness, and combat veterans
- C. 8-12% of adults suffer from PTSD at some point in life
- D. 13 to 31% of military veterans affected
- E. It is a dysfunction of the body's stress-coping system
- F. Higher resting heart rate, strong association to smoking, higher resting blood pressure, cognitive and mood disturbances, may lead to depression, obesity and metabolic syndrome, major risk factor for chronic diseases such as diabetes and cardiovascular disease, abnormal changes in cortisol and norepinephrine, chronic activation of the body's 'flight-or-fight' mechanism from PTSD disrupts several key neurobiological systems, may lead to alcohol and substance abuse. PTSD sufferers tend to overreact to minor stimuli; easily startled. PTSD clients may experience helplessness and loss of self-control. PTSD symptoms can be intermittent or chronic and vary in severity from person to person
- G. Currently, there is no cure for PTST. Exercise does appear to elevate mood, reduce anxiety and buffer stress. The BEST type of exercise is low-to-moderate intensity of exercise, mind-body modes of movement, low intensity aerobics and pranayama breathing techniques. Tsatsoulis, A. and Fountoulakis, S. (2006). The protective role of exercise on stress system dysregulation and comorbidities. *Annals of the New York Academy of Sciences*, 1083, 196-213.

- H. PTSD and the personal trainers; remember, symptoms vary from day to day; be aware of triggers such as loud noises or crowded environments, ask client about triggers, provide a safe workout environment, know what medications a client is taking, fatigue is a common symptom of PTSD. Try to be non-competitive. Help your client build confidence and self-efficacy with exercise. Be patient and realistic with your exercise program design. Always be flexible and nonjudgmental. And be prepared for mood alternations...stop, talk and listen to your client.
- I. How to help a client experiencing a PTSD episode; Kim et al. (2012). PTSD and exercise. What every exercise professional should know. IDEA Fitness Journal, 9(6), 20-23. Have client take a comfortable position, encourage him/her to try to breathe slow and relax, verbalize to client that he/she is safe, let the client know you are there to help, address the client by his/her name, ask questions to re-orient client (e.g., what is today's date, how many children do you have), slowly bring client back to present place. If necessary, refer client to a qualified health provider

X. 10 fascinating facts of the human brain

1) The brain, which weighs 3 lbs has 100 billion neurons, 2) The brain has ~100,000 blood vessels, 3) You continue to make NEW neurons throughout life, as long as you challenge your brain mentally, 4) The brain uses 20% of the body's total oxygen supply, 5) Too much stress alters brain cells, brain structure and function, 6) You can't tickle yourself—the brain can distinguish between an unexpected touch and your own touch, 7) While awake, your brain generates between 10 to 23 watts of power: enough to power a light bulb, 8) Every time you blink, the brain 'kicks in' to keep things illuminated so the world doesn't go dark (during the blink). You blink 20,000 times a day, 9) The average number of thoughts you experience each day is about 70,000, 10) There are no pain receptors in the brain, so it can't feel pain.

XI. Creating brain happiness: Useful lessons to handle stress and improving brain health. Chiesa, A. and Serreti, A. (2008). Mindfulness-based stress reduction for stress management in healthy people: A review and meta-analysis. Journal of Alternative and Complementary Medicine, 15(5), 593-600. Stress is what you experience when you're having trouble effectively managing some of life's situations (Hans Selye)

- A. Major stressors: divorce, serious illness, and financial crisis
- B. Moderate stressors: lose your wallet, denting the car, catching a cold
- C. Micro-stressors: noisy traffic, crowds, long lines at a store, cell phones going off in a theatre
- D. Physical signs of stress: Tired/fatigue, rapid pulse, headache, shakiness, muscle aches, over eating, lack of appetite, body tension, sleep difficulties, lowered libido, unusual fidgeting, rashes, hives, itching
- E. Stress mechanism: acute stressor activates amygdala in brain; this activates the HPA axis (hypothalamic to pituitary gland to adrenal glands; adrenal glands secrete epinephrine and norepinephrine=STRESS
- F. Psychological signs of stress: Irritability, worry and anxiety, impatience, panic, moodiness, sadness, feeling upset, loss of sense of humor, memory lapses, lowered productivity, and feeling overwhelmed
- G. We all have an optimal stress balance: Claude Bernard (1813-1878)
- H. We all have a biological need to 'disengage'
- I. May need frequent breaks during the day, which are 'get away recharging' moments
- J. How do civilized society people tend to cope? Watching TV, skipping exercise, eating more fats and sugars: These are not great ways to buffer stress. TIPS TO REDUCE STRESS
- K. Put your cell phone away at times; Be careful about doing too much work at home as it blurs the line between work and leisure; Take a vacation to unwind and disengage; Visit friends...social isolation increases stress, Exercise regularly...it buffers stress hormones; Do something kind for someone else; Vary your daily routine...novelty stimulates new neural connections, Be a lifelong learner; Include creativity in life (paint, write, design, play instrument); Learn diaphragmatic (Pranayama) breathing

XII. So, what is Pranayama breathing: Understanding the practical application. Sovik, R. (2000). The science of breathing – The yogic view. Progress in Brain Research, 122 (Chapter 34), 491-505.

- A. Yoga and meditation combined
- B. Prana=energy, yama=control, ayama=to expand
- C. Pranayama breathing is the ‘the practice of voluntary breath control’
- D. It is ‘the intermediary between mind and body’
- E. It refers to ‘life force’
- F. Breathing supplies the oxygen for life
- G. Goal of Pranayama breathing: not to override the autonomic system control; but to provide a temporary shift away from its sympathetic (accelerating) dominance
- H. The Goal of Pranayama breathing is to reset the autonomic nervous system
- I. How does Pranayama breathing work?
- J. During the day we are affected by fatigue, emotional arousal, lost of self-control, sleep deprivation, hormones release, life behaviors disruption: all lead to STRESS
- K. This stress manifests itself in pain, muscle tension, high blood pressure, somatic turmoil, mental health problems, weakened immune, shallow breathing patterns and an elevated sympathetic nervous system
- L. Pranayama breathing is a ‘neutralizing’ intervention to the consequences of stress
- M. Health benefits from Pranayama breathing. Jerath, R. et al (2006). Physiology of long pranayamic breathing: Neural respiratory elements may provide a mechanism that explains how slow deep breathing shifts the autonomic nervous system. Medical Hypothesis, 67, 566-571.
 - 1. Improve immune function
 - 2. Lower high blood pressure
 - 3. Lessen asthma symptoms
 - 4. Balance neural imbalances
 - 5. Improve stress-related disorders
 - 6. Improve psychological health
- N. What is the physiological mechanism at work? Balancing the parasympathetic and sympathetic nervous systems
- O. Pranayama breathing and yoga connection? “The practice of asanas develops the muscular strength and flexibility to maintain good posture alignment, which improves diaphragmatic breathing.” (Slovic)
- P. How do you do Pranayama breathing? Activate the diaphragm. Let’s try it.

X. Let’s simulate the brain with some illusion teasers: What do you see? PLUS, some ‘Think Different Be Different Practical Applications from the Field’

XIII. The science of happiness. Time magazine, January 17, 2005

- A. Eight steps to a satisfying life!
- B. Count your blessings: “gratitude journal”
- C. Practice acts of kindness: random and systematic
- D. Savor life’s joys: take mental photographs
- E. Thank a mentor: Now
- F. Learn to forgive: let go of anger and resentment (without, you won’t move forward)
- G. Invest time and energy in friends and family
- H. Take care of your body
- I. Develop strategies for coping with stress and hardships

Final Quote from Albert Einstein. “The true sign of intelligence is not knowledge, but imagination.”