

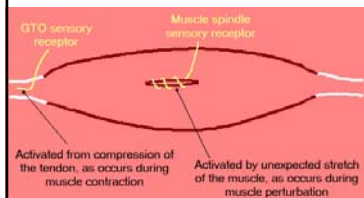
A New Prescription:

Exercise and the Groundbreaking Techniques for the Treatment of ADHD, Aggression, and Autism Spectrum Disorder.

Beta-blockers Today


- [Beversdorf DQ³, Saklayen S, Higgins KF, Bodner KE, Kanne SM, Christ SE](#) Effect of propranolol on word fluency in autism. [Cogn Behav Neurol](#). 2011 Mar;24(1):11-7. **Propranolol significantly improved performance on category fluency**
- Bodner KE, Beversdorf DQ, Saklayen SS, Christ SE. J Int Neuropsychol Soc. 2012 May;18(3):556-64 Individuals with ASD performed more poorly than non-ASD individuals in the working memory condition. Importantly, administration of propranolol attenuated this impairment, with the ASD group performing significantly better in the propranolol condition than the placebo condition
- Beversdorf DQ, Carpenter AL, Miller RF, Cios JS, Hillier A. [Effect of propranolol on verbal problem solving in autism spectrum disorder](#). [Neurocase](#). 2008;14(4):378-83 **ASD subjects benefited from propranolol on simple anagrams, whereas control subjects were impaired by propranolol.**

Muscle Spindles Activated by β -receptor



- Epinephrine causes an increase in muscle tension; readying the person to react to a threat
- β -blockers block the receptor to decrease the body's arousal peripherally.

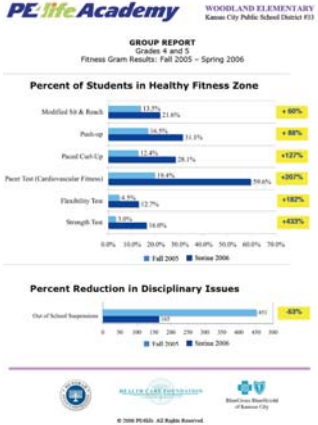





Phenomenon

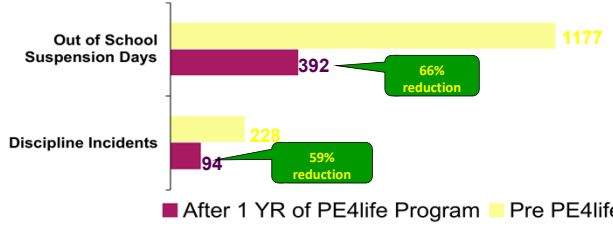
- Woodland Elementary School
2005 Fall
PE one day per week / 50 minutes.
2006 Jan - June
PE4life Program
Five days a week / 45 minutes.
- Inner city school with
80% of kids on free lunch program
- PE4LIFE added
Cardiac monitored watches,
Dance Dance Revolution,
A few exercise bicycles/fitness machines.

AND A NEW ATTITUDE


PE4life Programs help Reduce Disciplinary Incidents!

Major reduction of disciplinary issues in Woodland Elementary, (KCMO) site of a PE4life program



■ After 1 YR of PE4life Program ■ Pre PE4life


"PE4life has had a tremendous influence on the lives of our students. Students are also more motivated throughout the day, their enthusiasm is way up, and the discipline issues are way down". Craig Rupert, Principal, Woodland Elementary School




Public Magnet School Grades 4-8 Approximately 120 children
All on school breakfast and lunch programs.
Program: Added 40 minutes of exercise in the morning
Exercise was performed in gym in station format.

Activities included:
Basketball Dance Dance Revolution
Double Dutch" jump roping Pogo stick jumping

1st Semester 2006 - 2007 Outcomes: Disciplinary Referrals		
Year	2006	2007
Referrals:	661	353
Suspensions:	71	24



Teachers reported :
Students are more focused. Students are more focused during the MAP (Measure of Academic Progress) testing as well.
Teachers observed:
Students testing immediately after morning activities did better — meeting or exceeding individual growth targets — than middle scholars taking the test late morning or in the afternoon.



BRAIN GAINS


City Park Collegiate, Saskatoon, Saskatchewan

20 minutes/daily, 65-75% MHR, 4 months
All students ran after teacher began as well

Student 1- life changing-- reading comprehension 400%
Student 2- Controlled anger, ODD, improved 25% in all.

Grade 8

GO TO
WWW.JOHNRATEY.COM
Press PRESS- then Video-first one



Time In versus Time Out



IN THE MOMENT



The Power of PLAY

Play evolved – to promote survival. Play makes the brain smarter - more adaptable - higher animals.

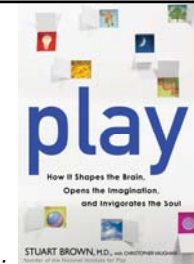
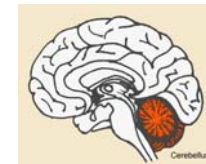
Play is the basis of social contact and group interaction - fostering empathy – The core of creativity and innovation.

Play gives us the ability to become smarter and more creative, to learn more about the world than the genes could ever teach, to adapt to a changing world.

In a world of continuously presenting unique challenges and ambiguities.. Play Prepares the Player to cope with the evolving planet.

The more recess... the better behaved and attentive the student or worker.

The species with the biggest brain size play the most. Humans should never stop!




Play: How it Shapes the Brain, Opens the Imagination, and Invigorates the Soul (2009)

Play prepares the player, to cope with the unique challenges and ambiguities of a world that is continuously changing. Play is necessary to keep our major brain systems synchronized.


The period when maximum play occurs - Ages 3-7 yrs is also the period of the most rapid growth of the cerebellum.

Animals at Play

Stuart Brown describes the pictures of a wild starving, male, polar bear entering the area where a group of huskies were waiting.



Churchill, Manitoba



The photographer was sure that he was going to see the end of his huskies as this 1200 lb polar bear had not eaten in 4 months., BUT

Shortly, before the Husky was in a crouched bow with tail wagging ready to play






Google: Polar Bear, Husky, Brown.

The Polar Bears returned every night that week to play with the dogs




Electronic Media:

Schools with the highest usage of electronic media – TVs, movies, computers – scored the highest on “non promoting of physical activity.”

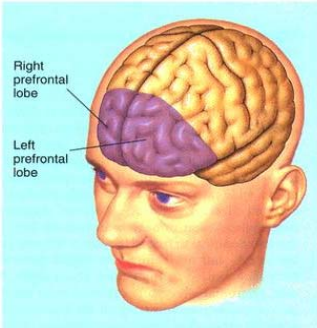
In schools with more fixed playground equipment, children were less active.

In schools with more portable equipment, i.e. balls and tricycles, children were more active.

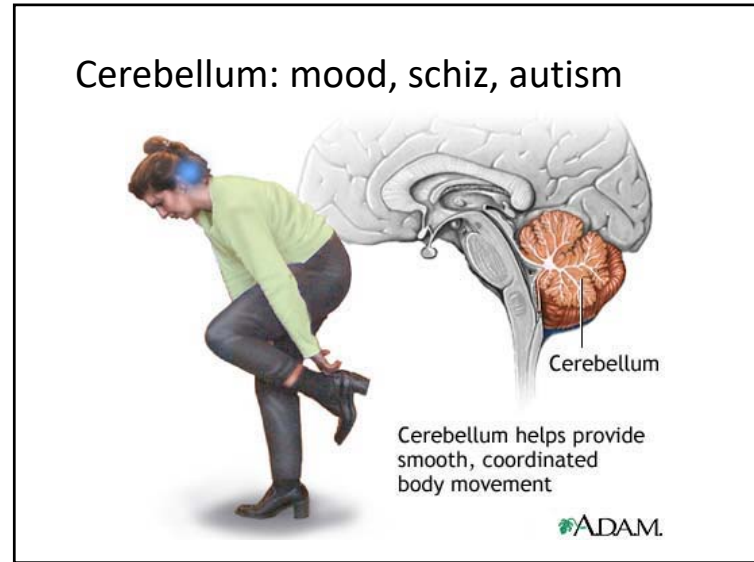
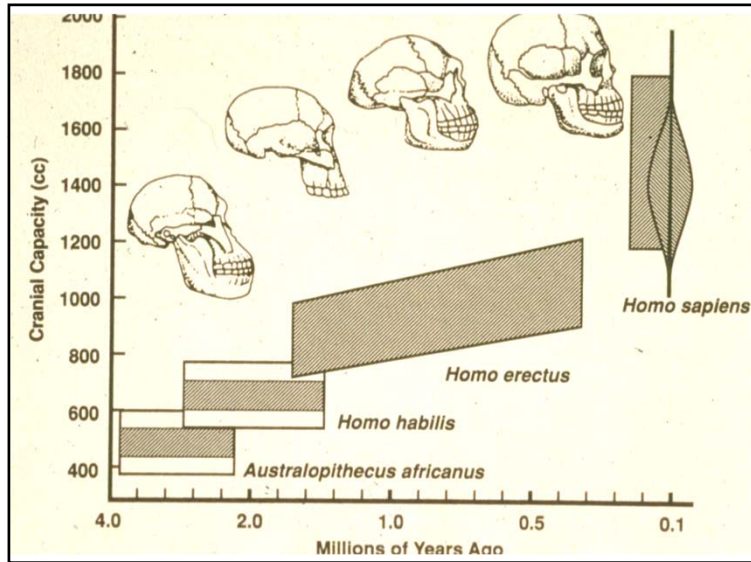




The Prefrontal Cortex Major Role in Executive Function

- EXERCISE particularly affects our Executive Function
 - Planning
 - Organization
 - Initiate or delay a response
 - Consequence evaluation
 - Learning from mistakes
 - Maintain the focus
 - Working Memory
- Dysfunction in these areas leads to disruption in the organization and control of behavior



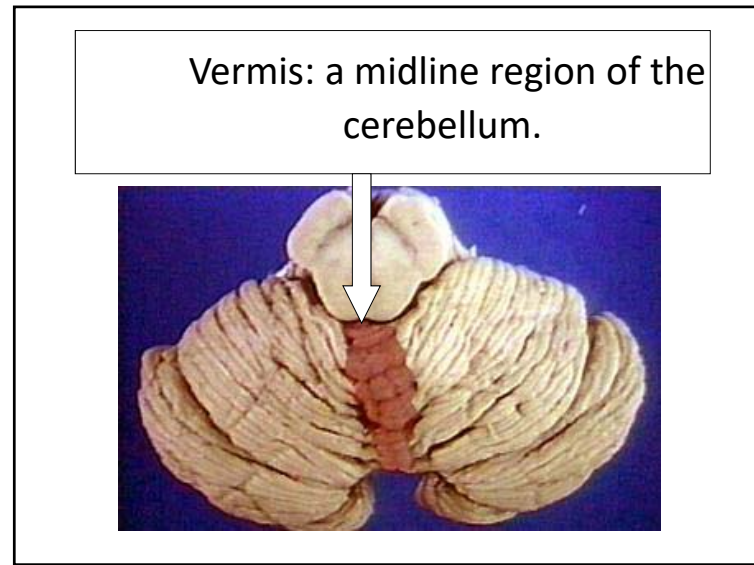
http://www.driesen.com/prefrontal_cortex.htm

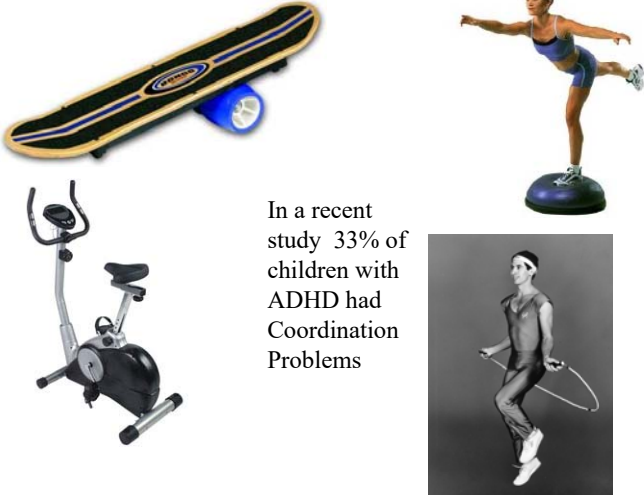


MORE NERVE TRAFFIC RISES UP FROM THE LIMBIC SYSTEM THAN DOWN FROM THE CORTEX. OUR EMOTIONS THEN RULE OUR COGNITIVE BRAIN.


AGE, EXPERIENCE, AND PRACTICE ADD TO OUR CORTEX' S ABILITY TO INHIBIT, CONTROL, SCULPT OUR BEHAVIORAL RESPONSES.

PSYCHOTHERAPY, DRUGS, LEARNING FROM ONES MISTAKES, COGNITIVE BEHAVIORAL TRAINING, VISUALIZATION, "ICON IMPLANTS" (RELIGION, NLP, HYPNOSIS, GROWTH-ALL CAN INCREASE THE POWER OF THE CORTEX TO HELP MASTER THE NETHER REGIONS





In a recent study 33% of children with ADHD had Coordination Problems



CENTER FOR DISCOVERY, HARRIS, NY 1000 ACRE FARM

+350 ADOLESCENT AUTISTIC KIDS

ALL VIOLENT – FAILURES OF PROGRAMS

MOVEMENT MEASURED UP TO 65% OF WAKING TIME

DIET

SLEEP

BIOPHILLIA

SMALL TRIBES

MINDFULNESS

CONNECTIONS

RE-WILDING TAKING PLACE

THEY ARE CANARIES IN THE COAL MINE. LOWER THEIR INTERNAL STATE OF NOISE AND CHAOS

FOREWORD BY DR. TEMPLE GRANDIN AND DR. JOHN RATEY

THERESA HAMLIN

AUTISM AND THE STRESS EFFECT

A 4-STEP LIFESTYLE APPROACH TO TRANSFORM YOUR CHILD'S HEALTH, HAPPINESS AND VITALITY

Motor Problems Predict Severity

- 159 ASD kids (14-33 months) relationship of fine and gross motor skills and social communicative skills. Fine motor and gross motor skills significantly predicted autism severity ($p < .05$).
- Children with weaker motor skills have greater social communicative skill deficits.
- working on motor skill with balance training and many different types of exercise has positive effect and outcome.



- DIET
- EXERCISE
- PLAY
- SLEEP
- BIOPHILLIA NATURE
- MINDFULNESS
- CONNECTION
- SMALL TRIBES

GO WILD

FREE YOUR BODY AND MIND
FROM THE AFFLICTIONS
OF CIVILIZATION

Eat fat, run free, be social,
and follow evolution's other rules for
total health and well-being

JOHN J. RATEY, MD
Coauthor of the National Bestseller SPARK and
RICHARD MANNING

Dance

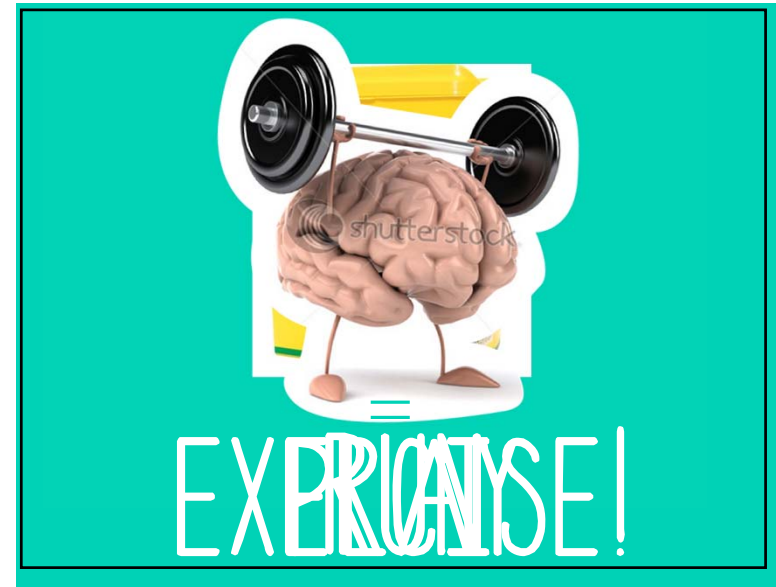
- 16 higher functioning ASD students had an hour once a week for 7 weeks and used a comparison group with no change in their treatment.
- Dance Therapy with mirroring movements
- Improved
- Self-esteem
- Body Awareness
- Social Skills

Koch SC, Mehl L, Sobanski E, Sieber M, Fuchs T. [Fixing the mirrors: A feasibility study of the effects of dance movement therapy on young adults with autism spectrum disorder](#). *Autism*. 2015 Apr;19(3):338-50.

Positive Exercise engagement

- Prior exercise- in 2 cases- reduced stereotypic behaviors
- The duration of the exercise was based on the pre-assigned criteria for satiation in consultation with the child's therapist.
- This leads to the possibility of testing to see how much exercise is useful
- Led to increased on-task behavior and task completion as well as a decrease in stereotypic behavior
- Jumping on a trampoline until satiated- mean time was 9 minutes for the 11yr old and 6 min for the 7 yr old

Neely L, Rispoli M, Gerow S, Niinci J. [Effects of antecedent exercise on academic engagement and stereotypy during instruction](#). *Behav Modif*. 2015 Jan;39(1):98-116. doi: 10.1177/0145445514552891



Exercise AND BDNF

↑ Inflammation

- Age-related cognitive decline
- Neurodegeneration (AD, PD)
- Neurotrophin resistance

↑ Exercise

- Metabolic syndrome
- Hypertension
- Insulin resistance

↓ Growth factor induction and signaling cascades

↑ Brain health

- Cognition
- Plasticity
- Neurogenesis
- Vascular function

TRIGGERS in Neurogenesis

Figure 2. Exercise induces growth factor cascades, a central mechanism mediating exercise-dependent benefits in cognition, synaptic plasticity, neurogenesis and vascular function. In addition, exercise induces peripheral risk factors for cognitive decline such as hypertension and insulin resistance, components of the metabolic syndrome that converge to increase the risk for brain dysfunction and neurodegeneration. Inflammation, which can impact growth factor signaling, exacerbate the metabolic syndrome and accelerate cognitive decline. It is reduced by exercise. Overall, exercise induces growth factor cascades and reduces peripheral risk factors for cognitive decline, all of which converge to improve brain health and function, and to delay the onset of and slow the decline in neurodegenerative diseases including Alzheimer disease (AD) and Parkinson's disease (PD).

EXERCISE HAS AN EFFECT TO INCREASE LIFE FORCES IN 4 WAYS:

1. SYNAPTIC PLASTICITY
2. NEUROGENESIS
3. COLLATERAL CIRCULATION,
4. Also IMPROVES HBP, DIABETES, OBESITY, OTHER RISK FACTORS

Cotman CW, Berchtold NC, Christie LA. Exercise builds brain health: key roles of growth factor cascades and inflammation. Trends Neurosci. 2007 Sep;30(9):464-72.

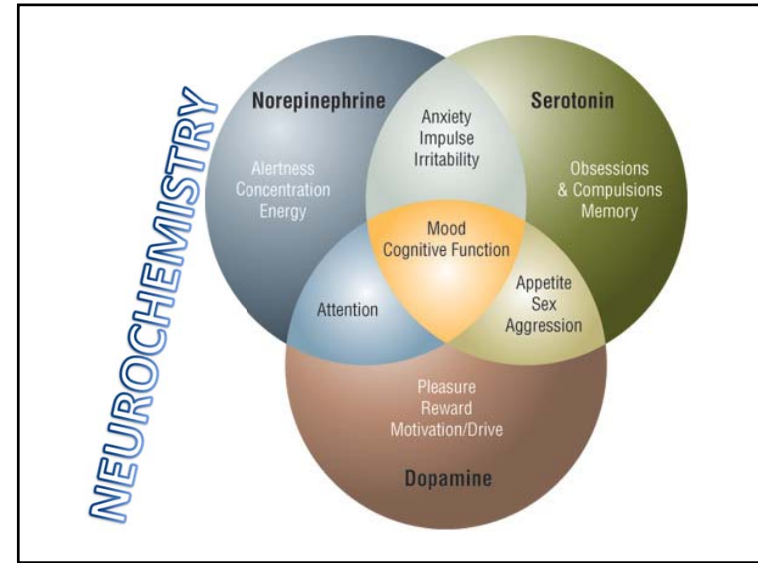
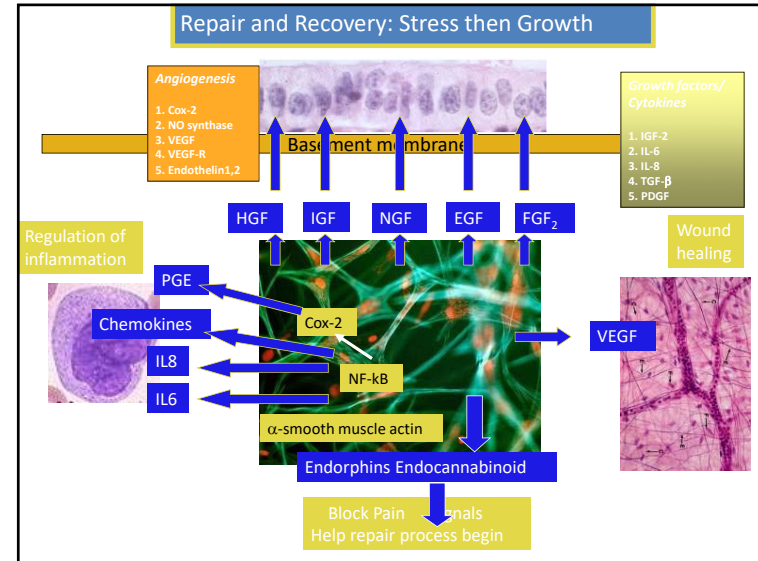
BDNF

Figure 2 Schematic presentation of the regulation of neurotransmitter synthesis and release in neurons. Depolarization produced by the release of glutamate (Glu) or acetylcholine (ACh) increases the production of NGF and BDNF mRNA. Conversely, NGF and BDNF enhance ACh release from septal cholinergic nerve endings. Inhibitory neurotransmitter GABA reduces neurotrophin mRNA levels. Corticosterone (C) increases NGF mRNA production, whereas triiodothyronine (T₃) stimulates NT-4 mRNA synthesis. BDNF release induces NT-4 mRNA production and increases intracellular calcium levels in hippocampal neurons. The release of NGF and probably BDNF in neurons occurs via both a constitutive and a regulated pathway.


BDNF and Anxiety, 2017

- Mechanistic studies in adult animals have demonstrated a link between anxiety, 5-HT, and brain-derived neurotrophic factor (BDNF), a major neurotrophic factor that undergoes elevated expression during the periadolescent period
- For example, SSRI administration increases the expression of BDNF in cortical and limbic brain regions, and BDNF is required for the anxiolytic and antidepressant actions of these agents
- BDNF is also a critical neurotrophic factor for the development and function of the 5-HT neurotransmitter system, and mutant rodent models with reduced BDNF signaling display increased anxiety behaviors.
- May have life long anxiolytic effects on the 5-HT system

BDNF, 5-HT, and Anxiety: Identification of a Critical Periadolescent Developmental Period. Duman RS. Am J Psychiatry. 2017 Dec 1;174(12):1137-1139. doi: 10.1176/appi.ajp.2017.17101084.





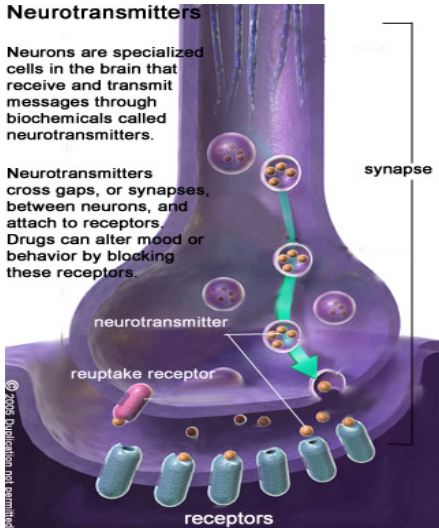


BUILD MORE NTs
AND RECEPTORS
THE BRAIN IS A
MUSCLE

Neurotransmitters

Neurons are specialized cells in the brain that receive and transmit messages through biochemicals called neurotransmitters.

Neurotransmitters cross gaps, or synapses, between neurons, and attach to receptors. Drugs can alter mood or behavior by blocking these receptors.



© 2008. Duplication and permission.



More GABA puts the breaks on!

Exercise increased prepro-galanin mRNA expression in the locus coeruleus

Exercise rats that were not injected (0x FG7142) exhibit increased (a) optical density for prepro-galanin mRNA in the locus coeruleus compared to sedentary counterparts. Suggesting that long durations of running are needed to increase galanin gene expression, the (b) optical density for prepro-galanin mRNA in the locus coeruleus was positively correlated with distance ran at 3 weeks. (c) The representative photomicrographs show ³⁵S-oligonucleotide binding directed towards prepro-galanin mRNA in the brain of rats that were not injected and either forced to remain in sedentary conditions (left) or allowed access to a running wheel (right) for three weeks. Sections were collected at -10.04 mm from bregma. Scale bar indicates 1 mm. Data are mean ± SEM (n = 9-10). *p < .01 vs. Sedentary 0x FG7142.

[Voluntary exercise offers anxiolytic potential and amplifies galanin gene expression in the locus coeruleus of the rat](#)

Behav Brain Res. ;233(1):191-200.

522 papers mostly in last 10 years on the effect of exercise on GABA levels to act as a regulator on the brain getting too overwhelmed.

Brings about equilibrium and protection of cells and circuits.

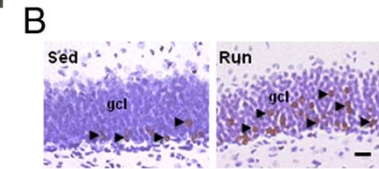


EXERCISING RATS MAKE MORE GABA CELLS IN HIPPOCAMPUS-

MORE RESISTANT TO THREATS – IMMEDIATE AND LONGER TERM

STRESSORS HAVE TO BE MORE THREATENING

6 WEEKS OF RUNNING VS CONTROL



[Physical exercise prevents stress-induced activation of granule neurons and enhances local inhibitory mechanisms in the dentate gyrus](#), Schoenfeld TL, Rada P, Pieruzzini PR, Hsueh B, Gould E. J Neurosci. 2013 May 1;33(18):7770-7. doi: 10.1523/JNEUROSCI.5352-12.2013.

Yoga increases GABA

There is a low level of GABA activity in both Anxiety and Depression. As well as Chronic Stress and PTSD. Exercise and Yoga both increase the level of GABA in the Hippocampus.

There was an acute increase in thalamic GABA levels immediately after the 60-min yoga session. These increases in thalamic GABA levels in the yoga group were positively correlated with improved mood and decreased anxiety. There were no significant changes in GABA levels in the walking group.

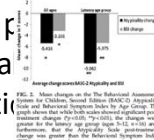


Effects of yoga versus walking on mood, anxiety, and brain GABA levels: a randomized controlled MRS study. [Streeter CC¹, Whitfield TH, Owen L, Rein T, Karri SK, Yakhkind A, Perlmutter B, Prescott A, Renshaw PF, Ciraulo DA, Jensen JE. J Altern Complement Med. 2010 Nov;16\(11\):1145-52](#)

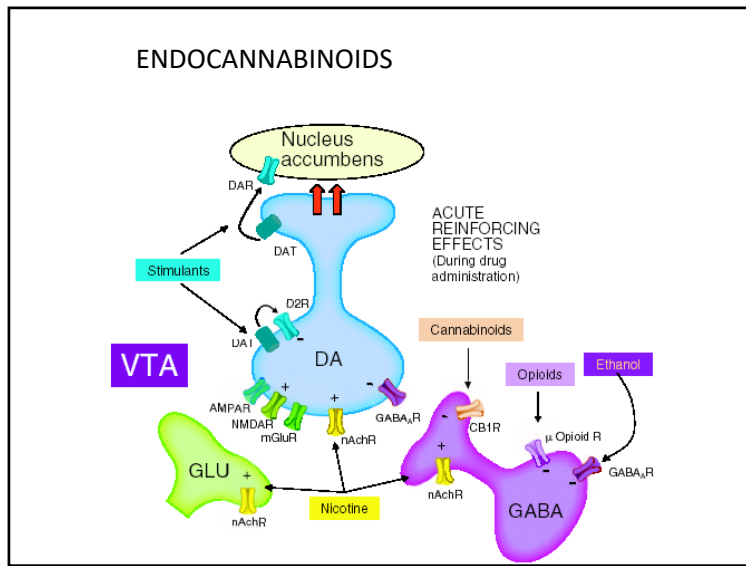
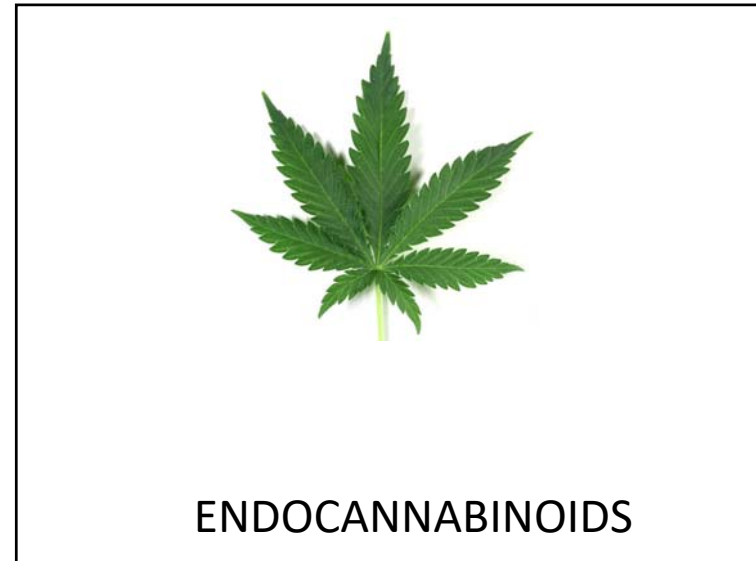
Yoga and ASD

- Twenty-four (24) children aged 3–16 years
- Intervention: The efficacy of an 8-week multimodal yoga, dance, and music therapy program based on the relaxation response (RR) was developed and examined.

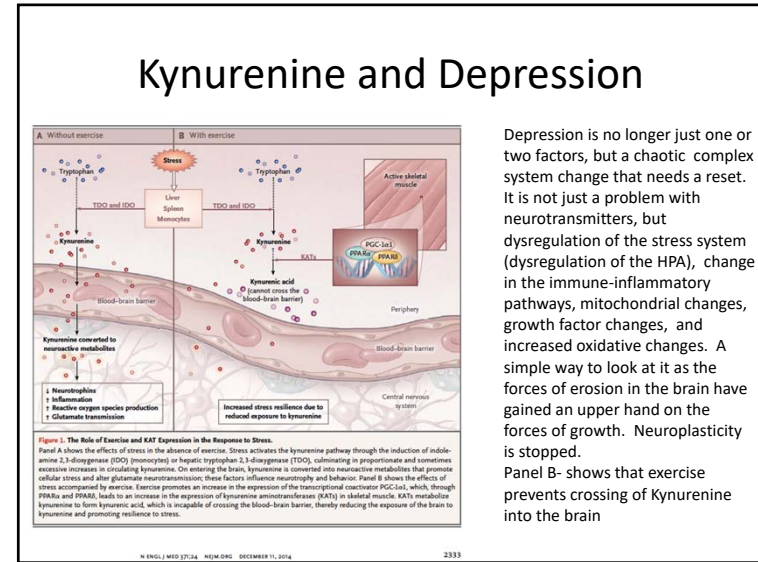
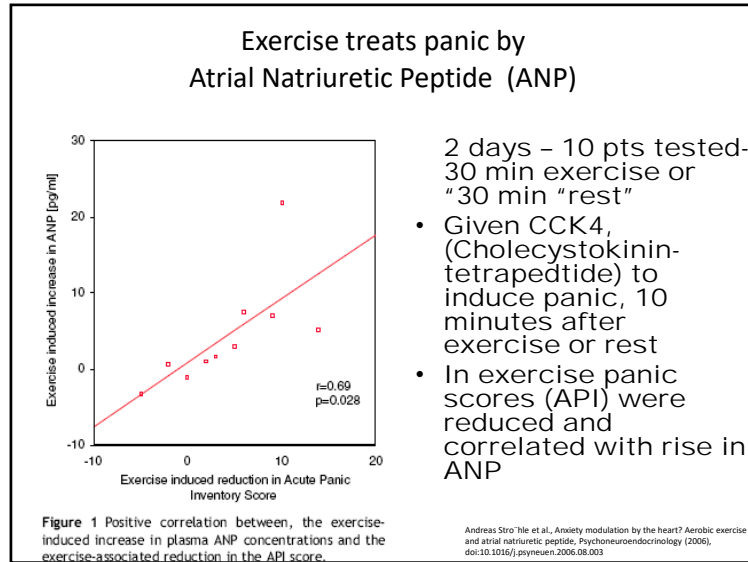
- Many parents reported changes on scales measuring general aggression, attention, and adaptive skills. All groups responded positively but kids 7-11 had the greatest changes, especially in behavior!



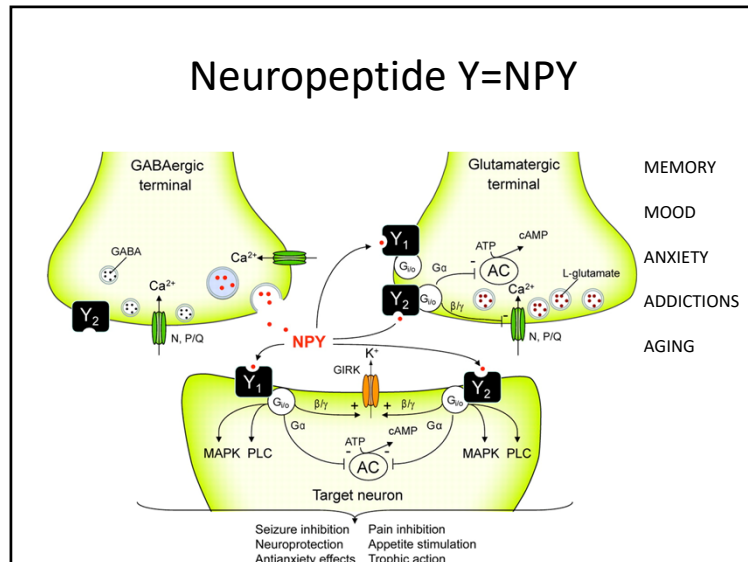
Rosenblatt LE, Gorantla S, Torres JA, Yarmush RS, Rao S, Park ER, Denninger JW, Benson H, Frichione GL, Bernstein B, Levine JB. [Relaxation response-based yoga improves functioning in young children with autism: a pilot study.](#) J Altern Complement Med. 2011 Nov;17(11):1029-35.

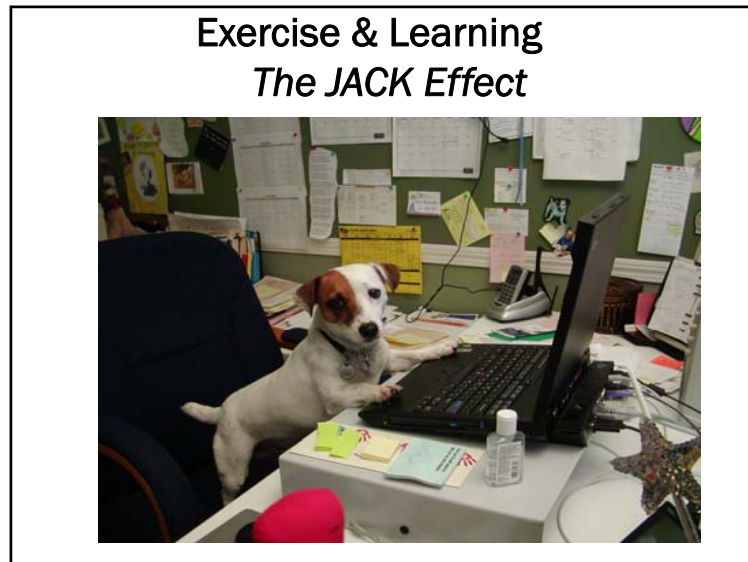
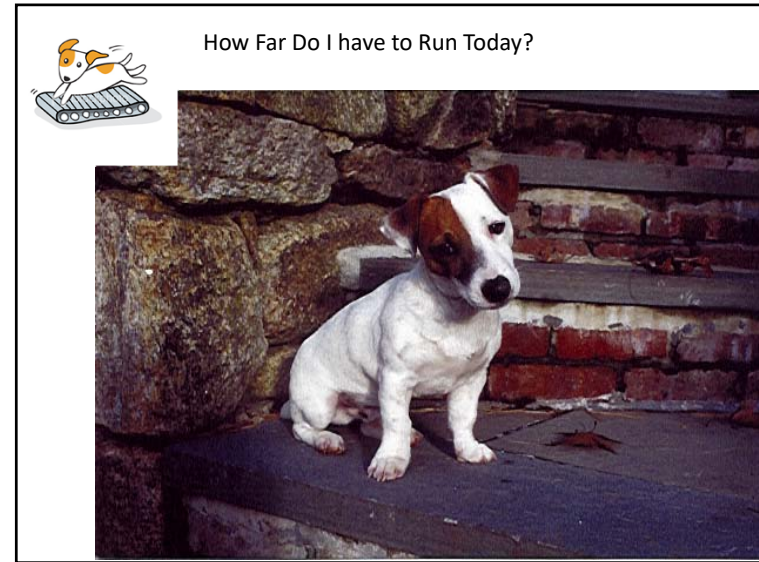


Did you know that a twenty-second hug releases the bonding hormone and neurotransmitter oxytocin, *which is nature's antidepressant and antianxiety*



Depression is no longer just one or two factors, but a chaotic complex system change that needs a reset. It is not just a problem with neurotransmitters, but dysregulation of the stress system (dysregulation of the HPA), change in the immune-inflammatory pathways, mitochondrial changes, growth factor changes, and increased oxidative changes. A simple way to look at it as the forces of erosion in the brain have gained an upper hand on the forces of growth. Neuroplasticity is stopped. Panel B- shows that exercise prevents crossing of Kynurenine into the brain





DOPAMINE

ENDORPHINS

ENDOCANNABINOIDS

BDNF

GABA

SEROTONIN

MICHAEL PHELPS OFF RITALIN



At age 9, Michael was put on Ritalin, a stimulant used to treat hyperactivity. His mother thinks it helped a little. He seemed to be able to focus longer, he could get through homework without moving around so much. She said he was still a middling student. It might have raised some C's to B's, she said. But if a homework assignment had to be at least four sentences, she said, He'd just do four sentences.

After two years, Michael asked to get off the meds. He had to go to the school nurse's office to take a pill at lunch, she said, and felt stigmatized. Just out of the blue, he said to me: 'I don't want to do this anymore, Mom.

After consulting with the Dr., Michael stopped medication. In the meantime, Michael the swimmer had appeared. By 10, he was ranked nationally in his age group. Ms. Phelps watched the boy who couldn't sit still at school sit for four hours at a meet waiting to swim his five minutes' worth of races.

At age 12 Michael needed an algebra tutor, and was so artsy in school that his mother suggested the teacher sit him at a table in the back. And yet he willingly got up at 6:30 daily for 90-minute morning practices and swam 2 to 3 hours every afternoon.



Chongqing 28 million people

When the Dog walker did not show up

