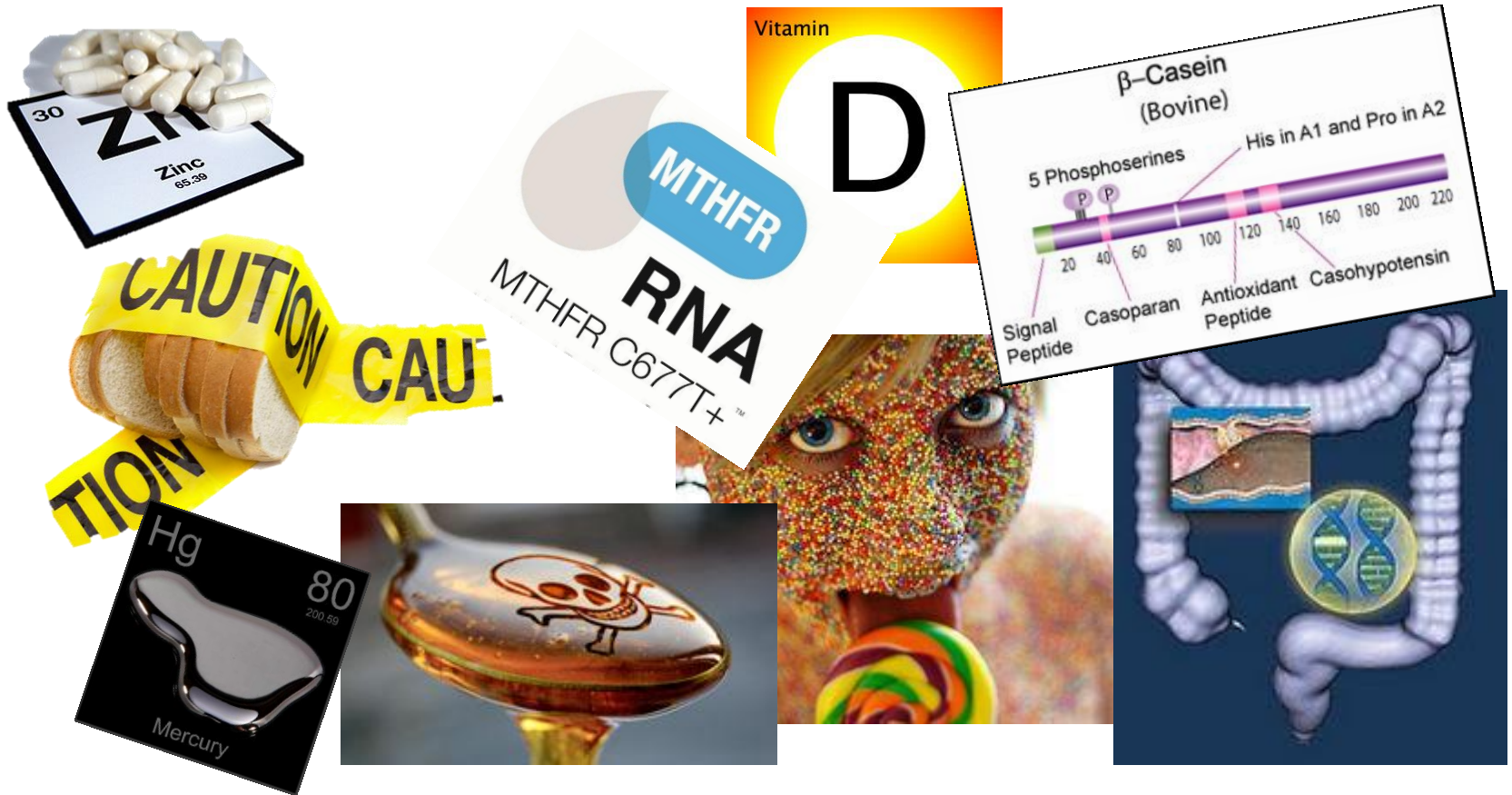


# **EXERCISE AND BRAIN HEALTH: A PRACTICAL GUIDE TO THE FORGOTTEN PAEDIATRIC THERAPY**

Nathan Rose BHSc(Nat)

Health World Ltd

# IS ACTIVITY A FORGOTTEN FACTOR IN PAEDIATRICS?



# INACTIVITY OF AUSTRALIAN CHILDREN A MAJOR CONCERN



Tomkinson G, et al; Active Healthy Kids Australia. Is sport enough? 2014 Report Card on Physical Activity for Children and Young People.

[http://www.heartfoundation.org.au/SiteCollectionDocuments/ahka\\_reportcard\\_longform.pdf](http://www.heartfoundation.org.au/SiteCollectionDocuments/ahka_reportcard_longform.pdf)

# AUSTRALIAN CHILDREN ARE SOME OF THE LEAST ACTIVE IN THE WORLD



Tremblay MS, et al. Physical activity of children: a global matrix of grades comparing 15 countries. *J Phys Act Health*. 2014 May;11 Suppl 1:S113-25.

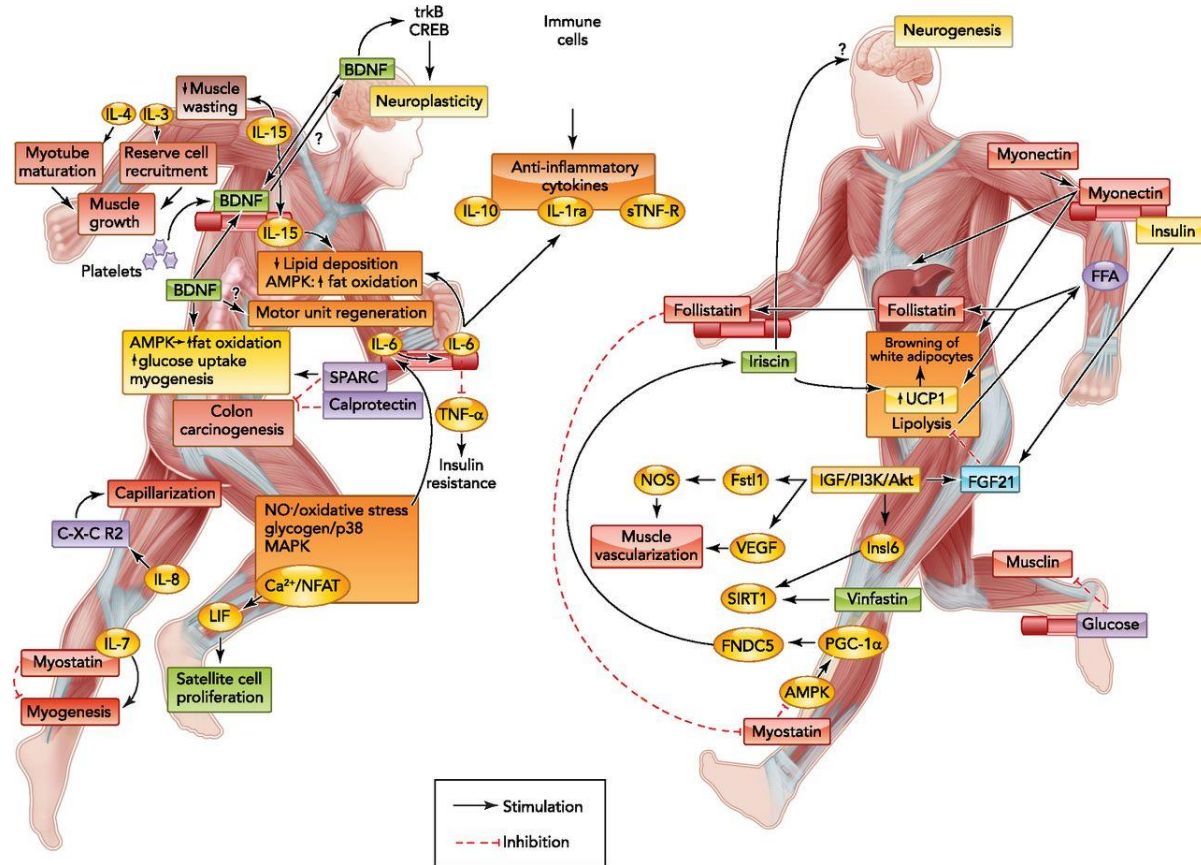
# ACTIVITY MORE IMPORTANT THAN DIET FOR AUSTRALIAN CHILDREN

- Overweight children were less physically active, both in terms of steps per day and moderate and vigorous physical.
- Overweight children did not consume more energy, fat, carbohydrate or sugar.

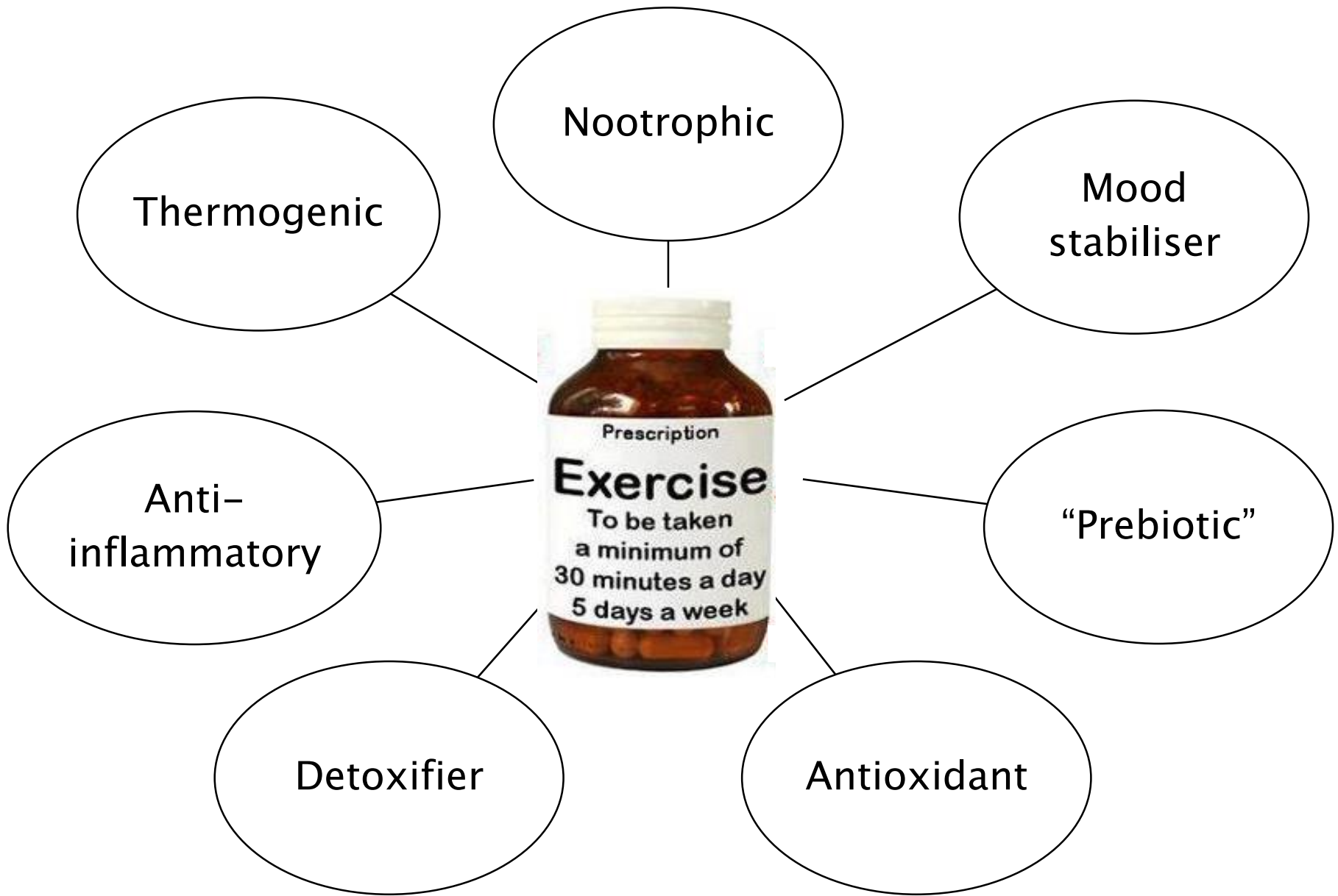


Telford RD, et al. Determinants of childhood adiposity: evidence from the Australian LOOK study. PLoS One. 2012;7(11):e50014.

# EXERCISE IS MORE THAN JUST A MEANS OF BURNING ENERGY

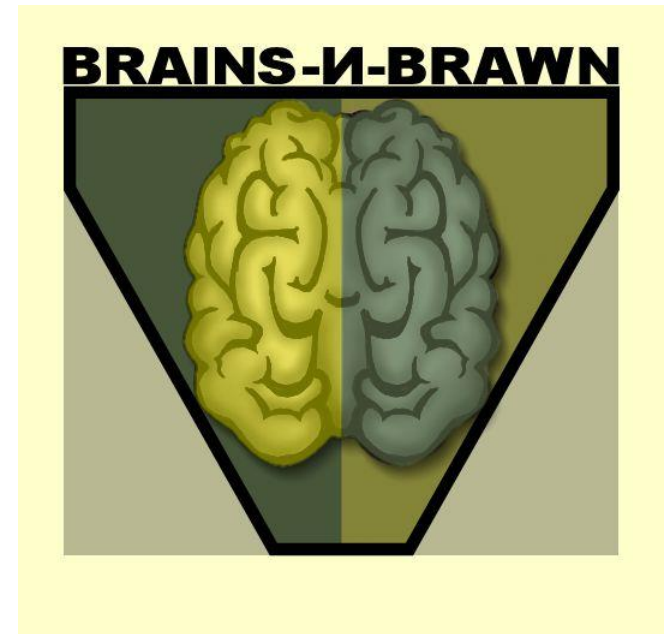


Fiuza-Luces C, Garatachea N, Berger NA, Lucia A. Exercise is the real polypill. *Physiology* (Bethesda). 2013 Sep;28(5):330-58.



# POOR MOTOR PERFORMANCE LINKED TO POOR COGNITIVE PERFORMANCE

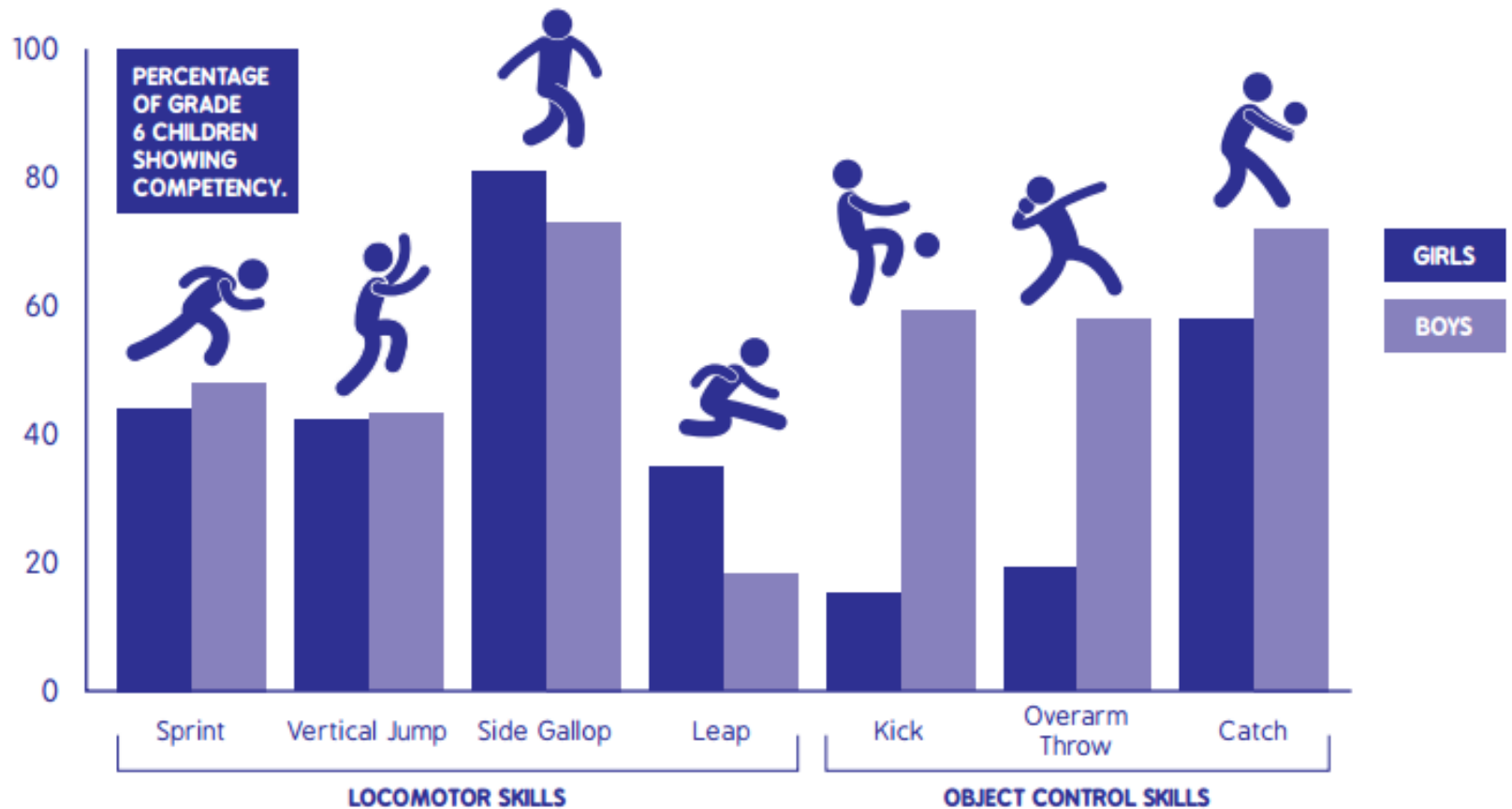
238 subjects (121 boys, 117 girls) aged between six and 15 years with the aim to explore the association between inattention, specific domains of executive functioning and motor ability. The authors found a strong association between attention and motor coordination.



Piek JP, et al. The relationship between motor coordination, executive functioning and attention in school aged children. Arch Clin Neuropsychol. 2004 Dec;19(8):1063-76.



# POOR RESULTS IN MOTOR SKILLS IN AUSTRALIAN CHILDREN



[http://www.heartfoundation.org.au/SiteCollectionDocuments/ahka\\_reportcard\\_longform.pdf](http://www.heartfoundation.org.au/SiteCollectionDocuments/ahka_reportcard_longform.pdf)

# EXERCISE PROGRAMS CULLED FROM SCHOOLS

The Advertiser  
ADELAIDE 14C-23C

REFRESH YOUR DRIVE

NEWS SPORT ENTERTAINMENT BUSINESS LIFESTYLE VIDEO CLASSIFIEDS

BREAKING NEWS LOCAL SOUTH AUSTRALIA NATIONAL WORLD TECHNOLOGY OPINION

## Free after-school sport axed for at least two terms

PAUL STARICK CHIEF REPORTER THE ADVERTISER DECEMBER 07, 2014 9:49PM

SHARE f t in g+ ✉ 41 COMMENTS SAVE THIS STORY

Ads By Google

**Recession Begins 2015** RBA documents prove Australia to enter recession. Report reveals all [www.dailyreckoning.com.au](http://www.dailyreckoning.com.au)



Funding cuts will mean children like Sturt St Primary School students Dayna, Jela, Imogen, Harry and James could miss out on playing after-school sports in the first half of next year. Picture: ROY VANDERVEGT

MERCURY NEWS.COM.AU

NEWS

Hobart 9°C - 14°C. Showers easing.

Open Colleges Flexible. Supportive. Online

NEWS SPORT ENTERTAINMENT BUSINESS LIFESTYLE

BREAKING TASMANIA SCALES OF JUSTICE POLITICS NATIONAL WORLD OPINION

## Sport program cut to save \$17,000

BRETT STUBBS • MERCURY • AUGUST 02, 2014 12:00AM

f t in g+ reddit ✉



Aaron Barwick, of Berriedale, and son Jacques, 12, are unhappy about the decision not to be part of School Sport Australia. Picture: Sam Rosewarne

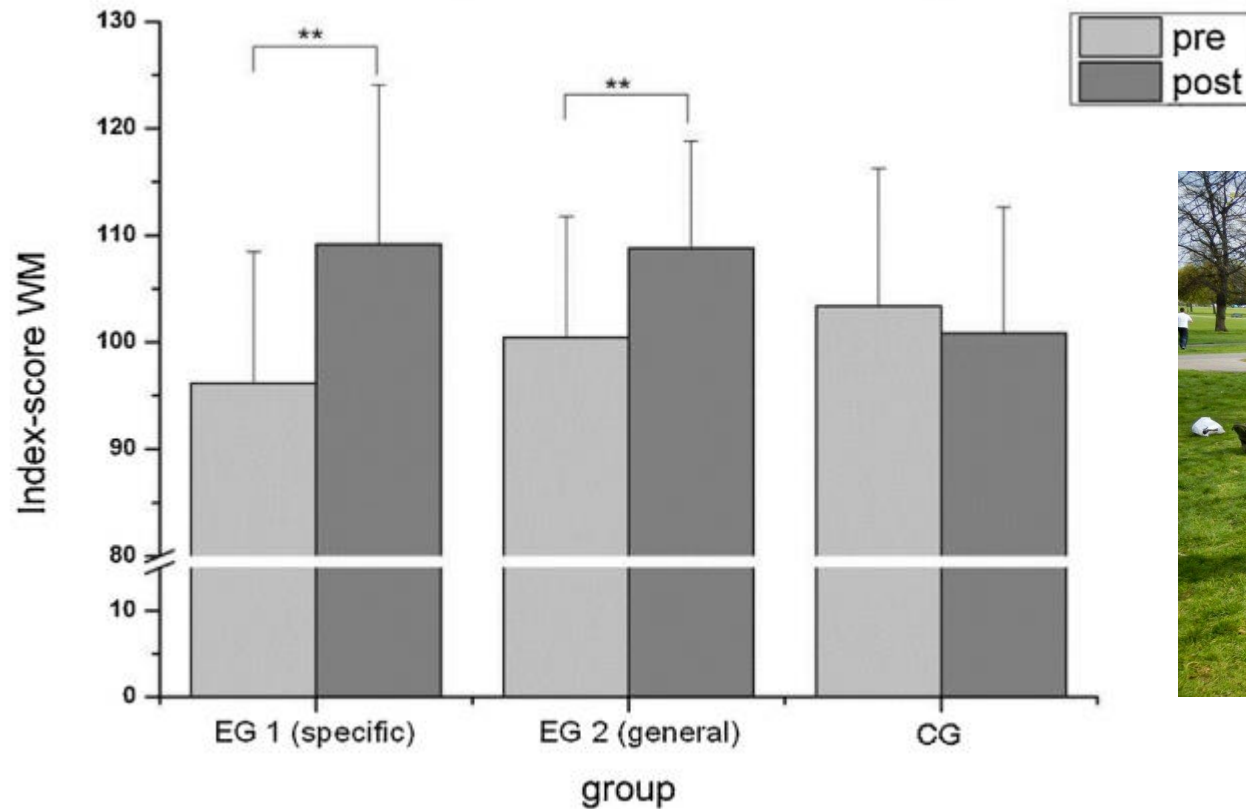
TASMANIAN schoolchildren have been denied the chance to participate on the

# A LITTLE LESS CONVERSATION, A LITTLE MORE ACTION

The most interesting finding is that physical activity produced effect sizes of 0.34 and 0.30, for IQ and academic achievement respectively. These are the two areas of cognition that educators would likely be most interested in improving, and ironically these are also the cognitive areas being considered when physical education programs are cut in favour of academic programs.

Sibley B, Etnier J. The relationship between physical activity and cognition in children: A meta-analysis. *Pediatric Exercise Science*, 2003;15, 243–256.

# PHYSICAL ACTIVITY IMPROVES ADHD



Ziereis S, Jansen P. Effects of physical activity on executive function and motor performance in children with ADHD. *Res Dev Disabil.* 2015 Mar;38:181-91.

# PHYSICAL ACTIVITY PROGRAM IMPROVES READING IN DYSLEXIC CHILDREN

Motor program  
including:

- balancing on one leg spinning
- bouncing
- standing on a wobble board
- tandem walking
- throwing and catching balls



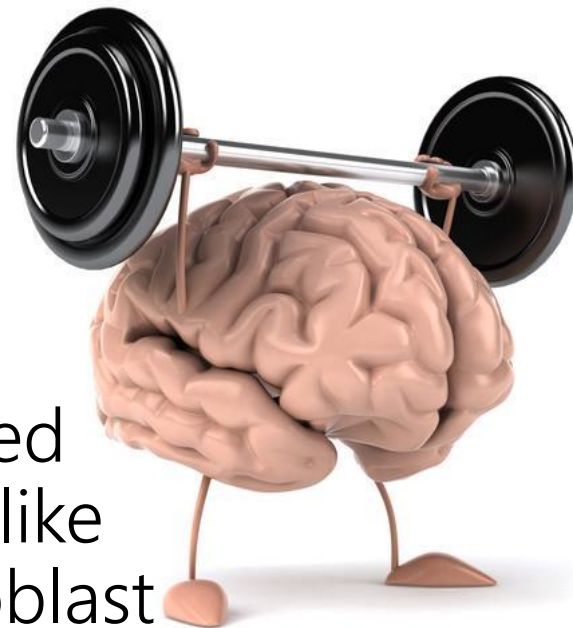
Improvements in:

- reading accuracy
- phonemic skill
- verbal working memory
- inattention symptoms
- school performance tests

# EXERCISE AND BRAIN FUNCTION

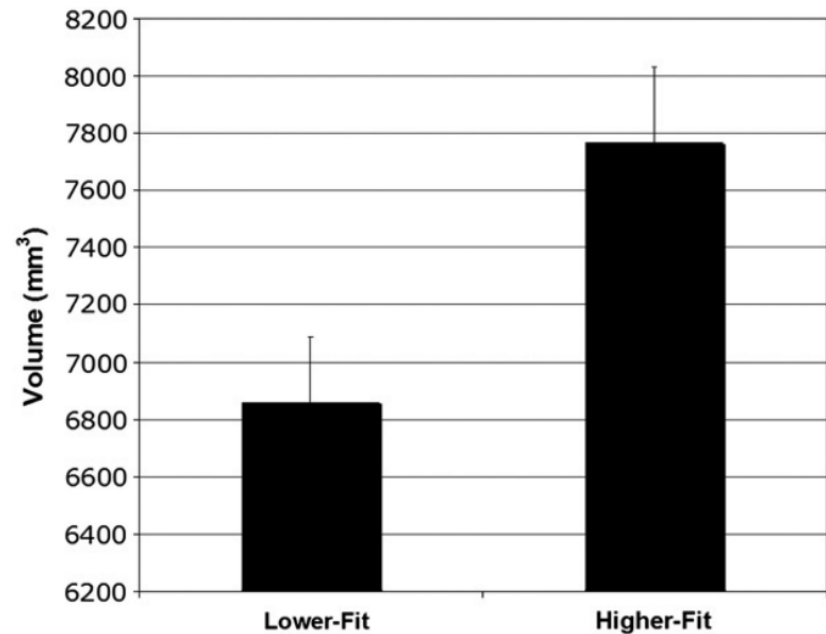
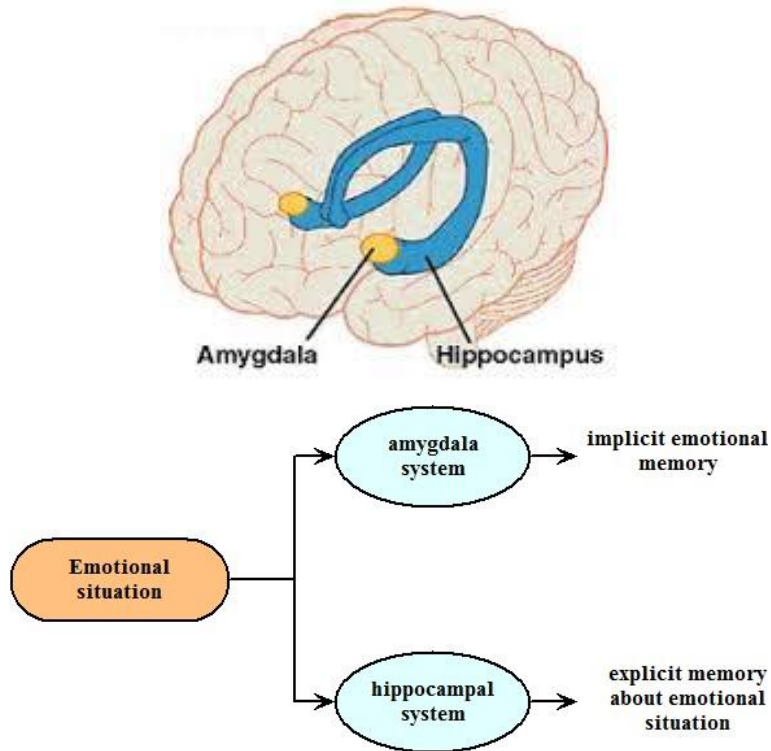
Suggested mechanisms of exercise on brain:

- Increased oxygen saturation and angiogenesis
- Increases serotonin, dopamine and norepinephrine
- Increase neurotrophins: brain-derived neurotrophic factor (BDNF), insulin-like growth factor (IGF-I) and basic fibroblast growth factor (bFGF)



Ploughman M. Exercise is brain food: the effects of physical activity on cognitive function.  
Dev Neurorehabil. 2008 Jul;11(3):236-40.

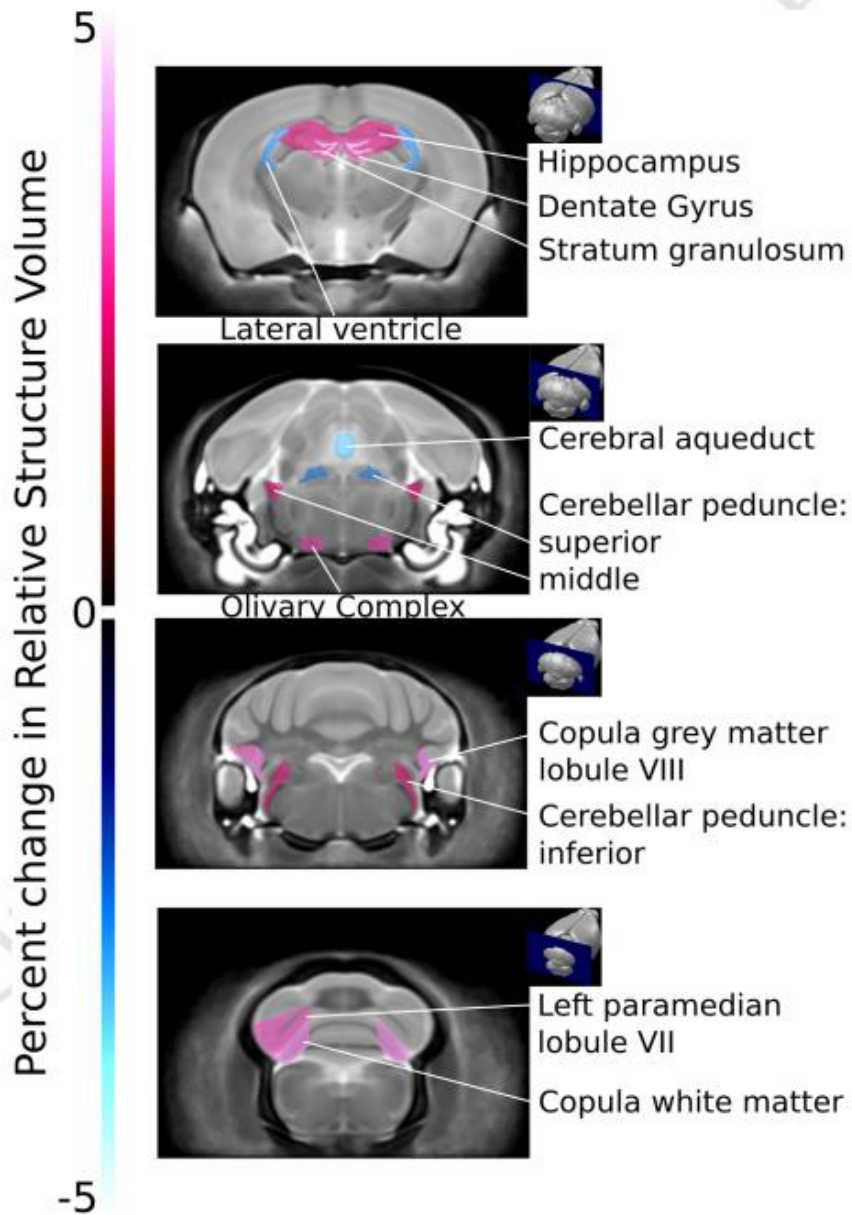
# FIT CHILDREN HAVE A LARGER HIPPOCAMPAL VOLUME AND BETTER MEMORY



Chaddock L, et al. A neuroimaging investigation of the association between aerobic fitness, hippocampal volume, and memory performance in preadolescent children. *Brain Res.* 2010 Oct

28;1358:172-83

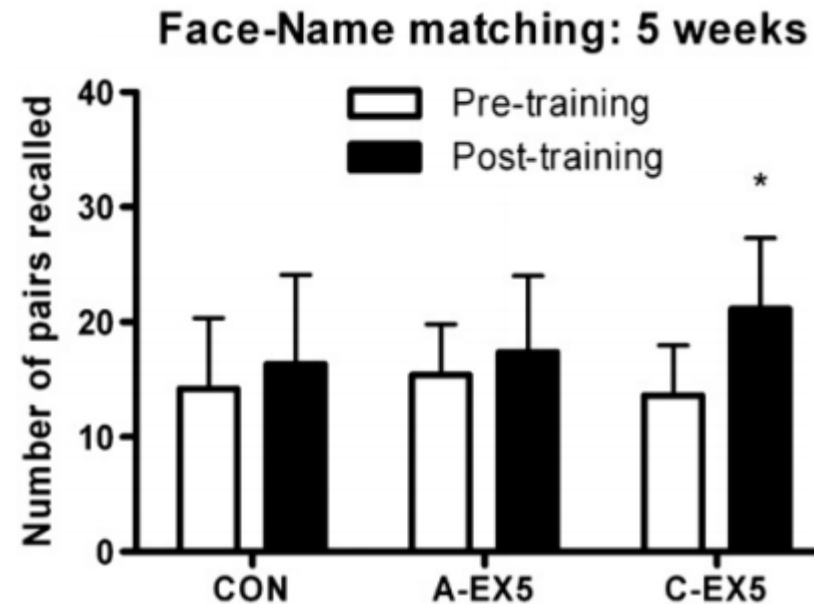
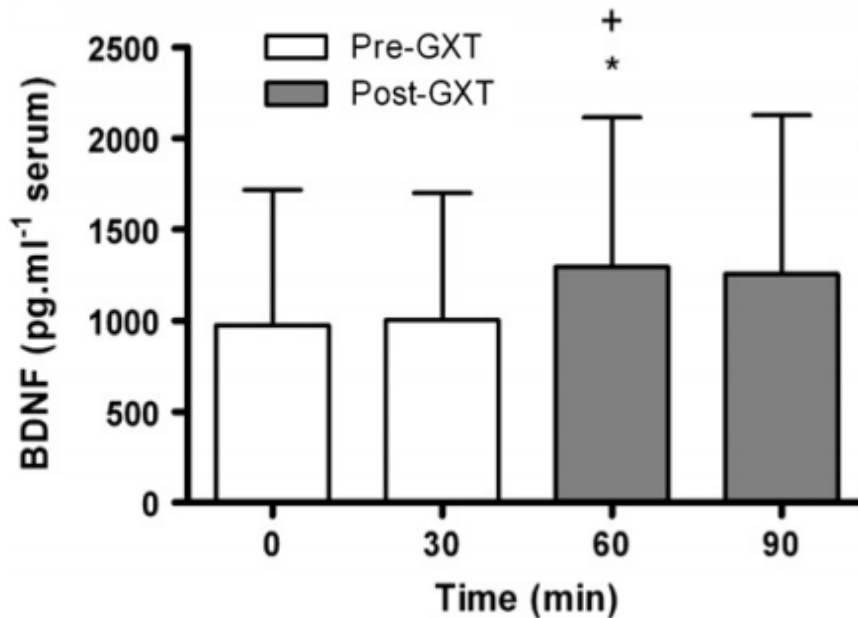
# EXERCISE INCREASES HIPPOCAMPAL VOLUME



Cahill LS, et al. MRI-detectable changes in mouse brain structure induced by voluntary exercise. Neuroimage. 2015 Mar 20. pii: S1053-8119(15)00218-9.

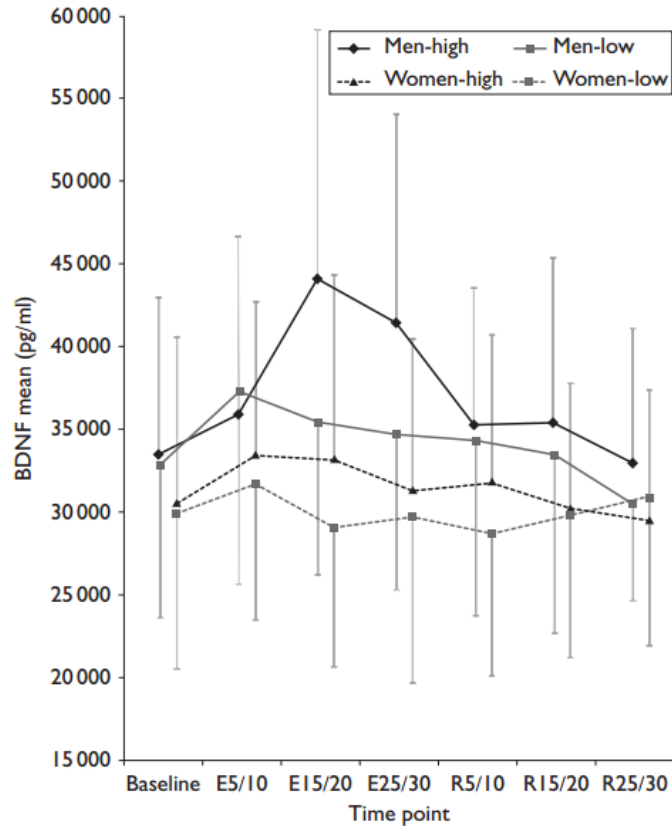


# REGULAR RUNNING INCREASES BDNF AND IMPROVES MEMORY

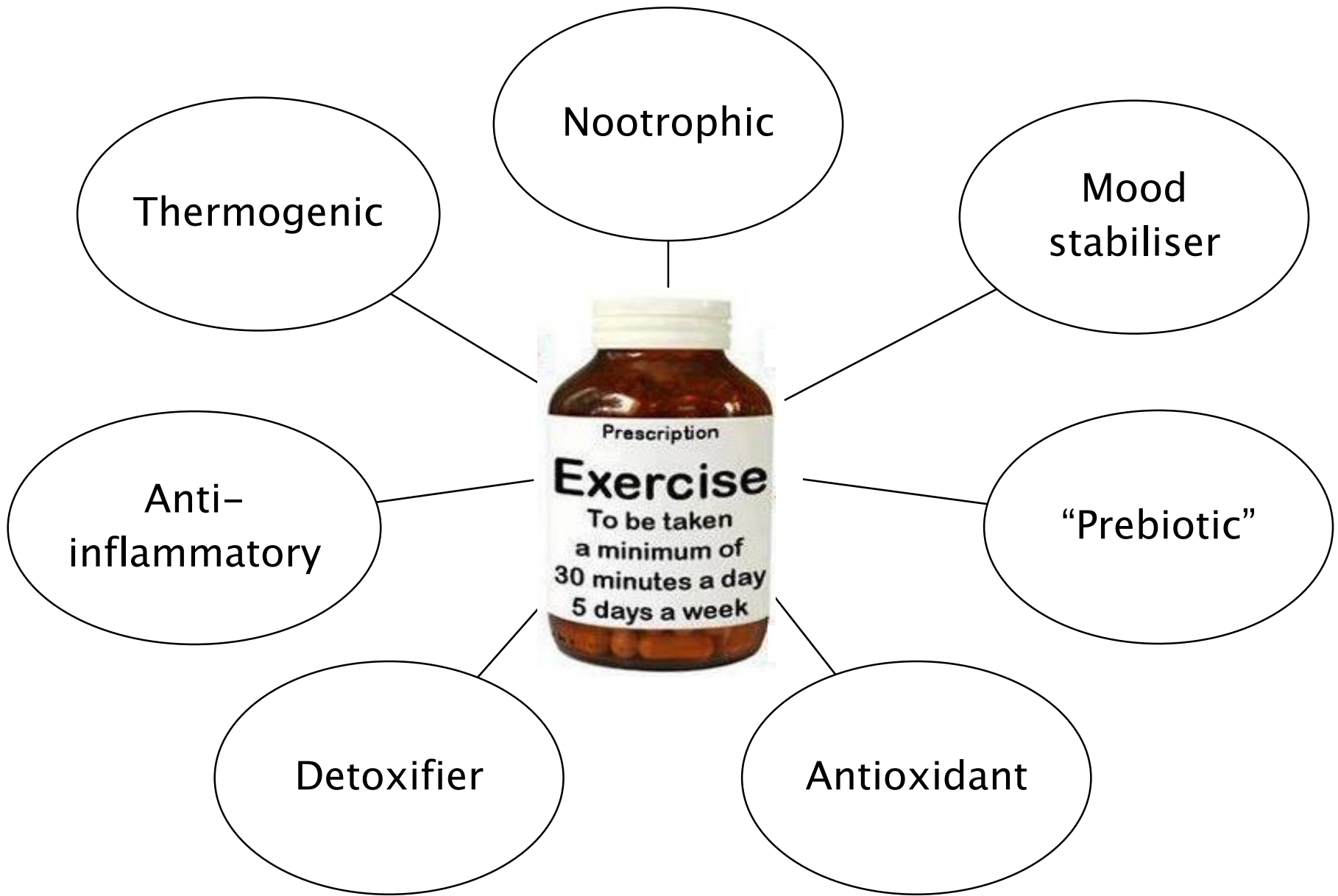


Griffin ÉW, et al. Aerobic exercise improves hippocampal function and increases BDNF in the serum of young adult males. *Physiol Behav.* 2011 Oct 24;104(5):934-41.

# HIGH INTENSITY EXERCISE INCREASES BDNF



Schmidt-Kassow M, et al. Kinetics of serum brain-derived neurotrophic factor following low-intensity versus high-intensity exercise in men and women. *Neuroreport*. 2012 Oct 24;23(15):889-93.



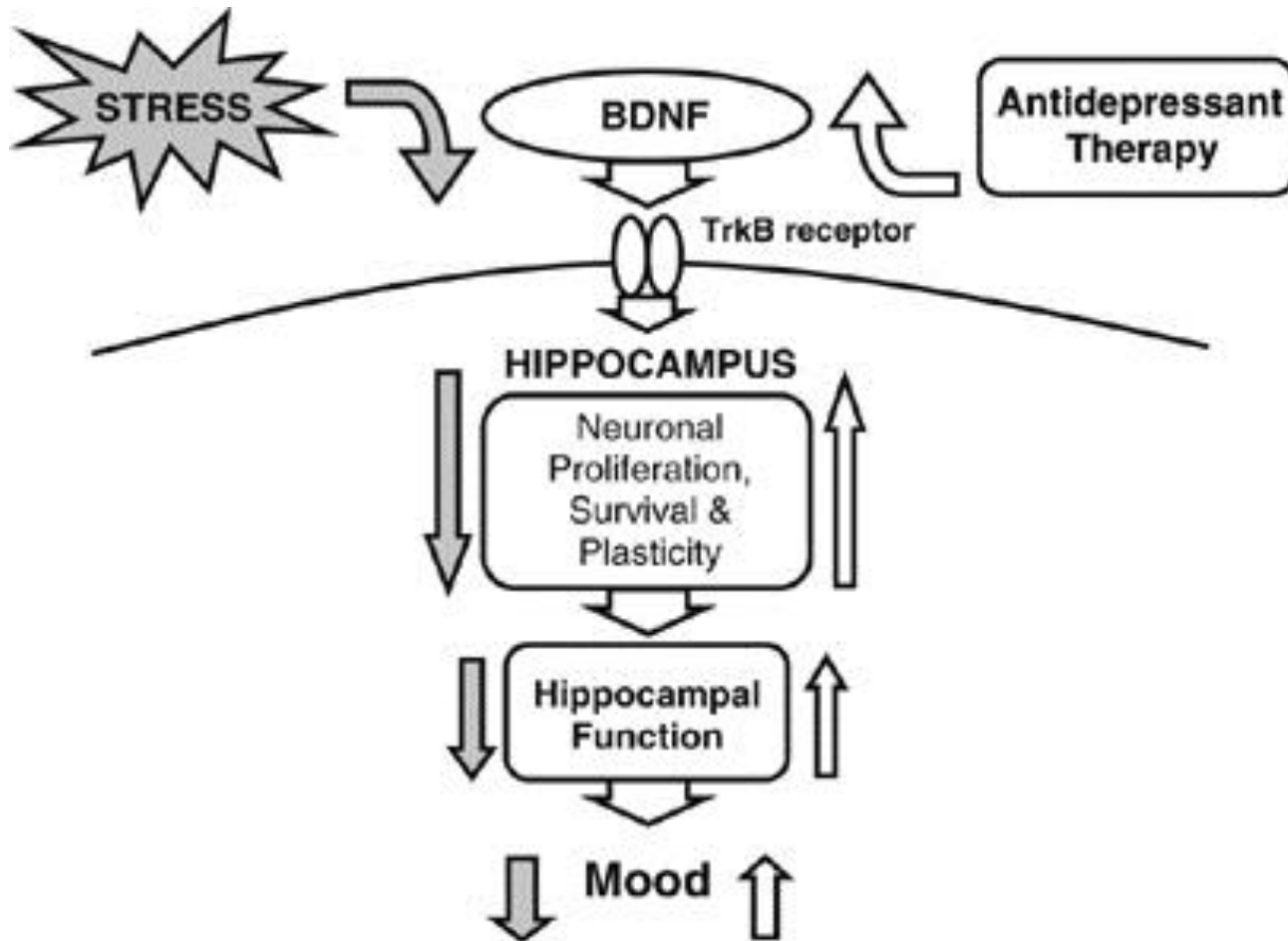
# INACTIVE CHILDREN HAVE HIGH RISK OF DEPRESSION

Relative risk of depressive symptoms for inactive classification was 2.8 to 3.4 times higher than it was for active, 1.3 to 2.4 times higher for children not playing sports outside of school, and 1.5 to 4.0 times higher for those not meeting health related fitness goals.



Tomson LM, et al. Childhood depressive symptoms, physical activity and health related fitness. *Journal of Sport & Exercise Psychology*, 2003:25, 419–439.

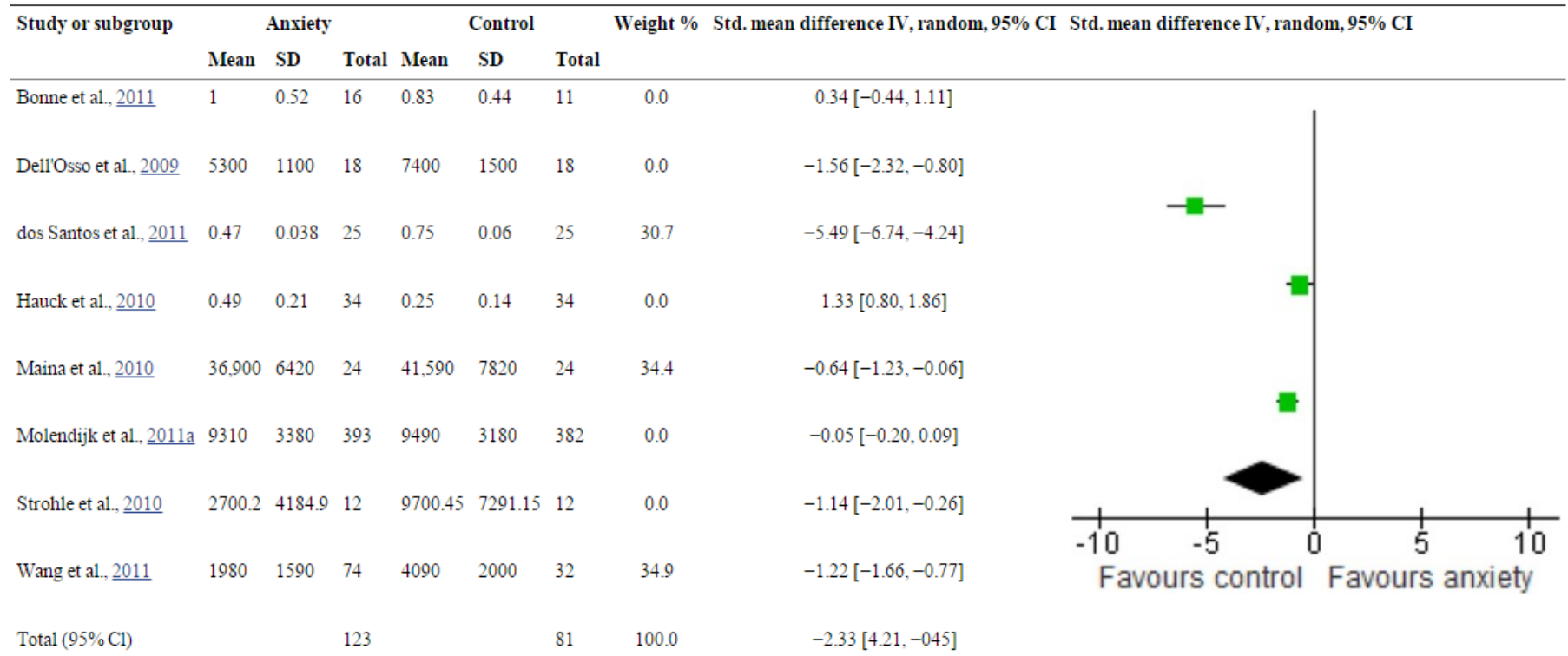
# BDNF IMPROVES MOOD



Groves JO. Is it time to reassess the BDNF hypothesis of depression? *Mol Psychiatry*. 2007 Dec;12(12):1079-88.

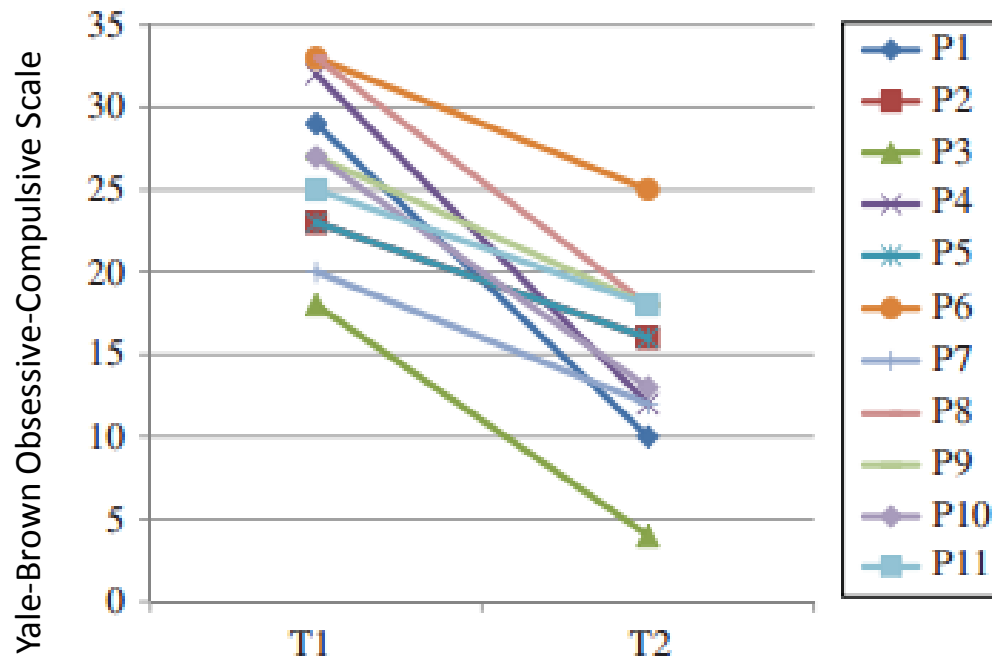
# LOW BDNF IN OBSESSIVE COMPULSIVE DISORDER

Subgroup analysis: OCD studies.



Suliman S, et al. Brain-Derived Neurotrophic Factor (BDNF) protein levels in anxiety disorders: systematic review and meta-regression analysis. *Front Integr Neurosci.* 2013 Jul 29;7:55.

# EXERCISE A USEFUL ADJUNCT IN OCD TREATMENT



Rector NA, Richter MA, Lerman B, Regev R. A Pilot Test of the Additive Benefits of Physical Exercise to CBT for OCD. Cogn Behav Ther. 2015 Mar 4:1-13.

# ROUGH AND TUMBLE PLAY LINKED TO IMPROVED EMOTIONS

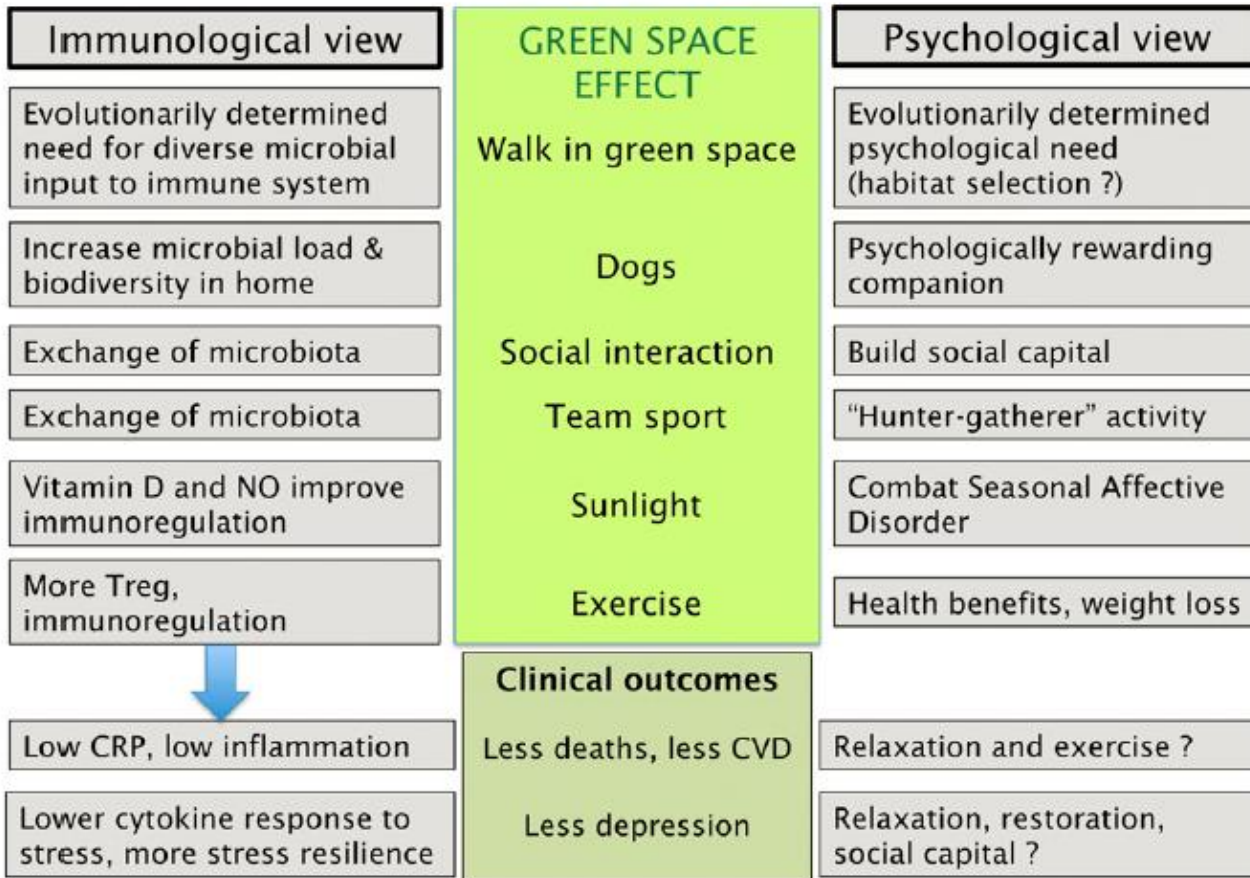


RTP-Q score was significantly, negatively correlated with father reports of difficulties and peer problems, with mother reports of emotional problems, and with both mother- and father-reported total problems scores.

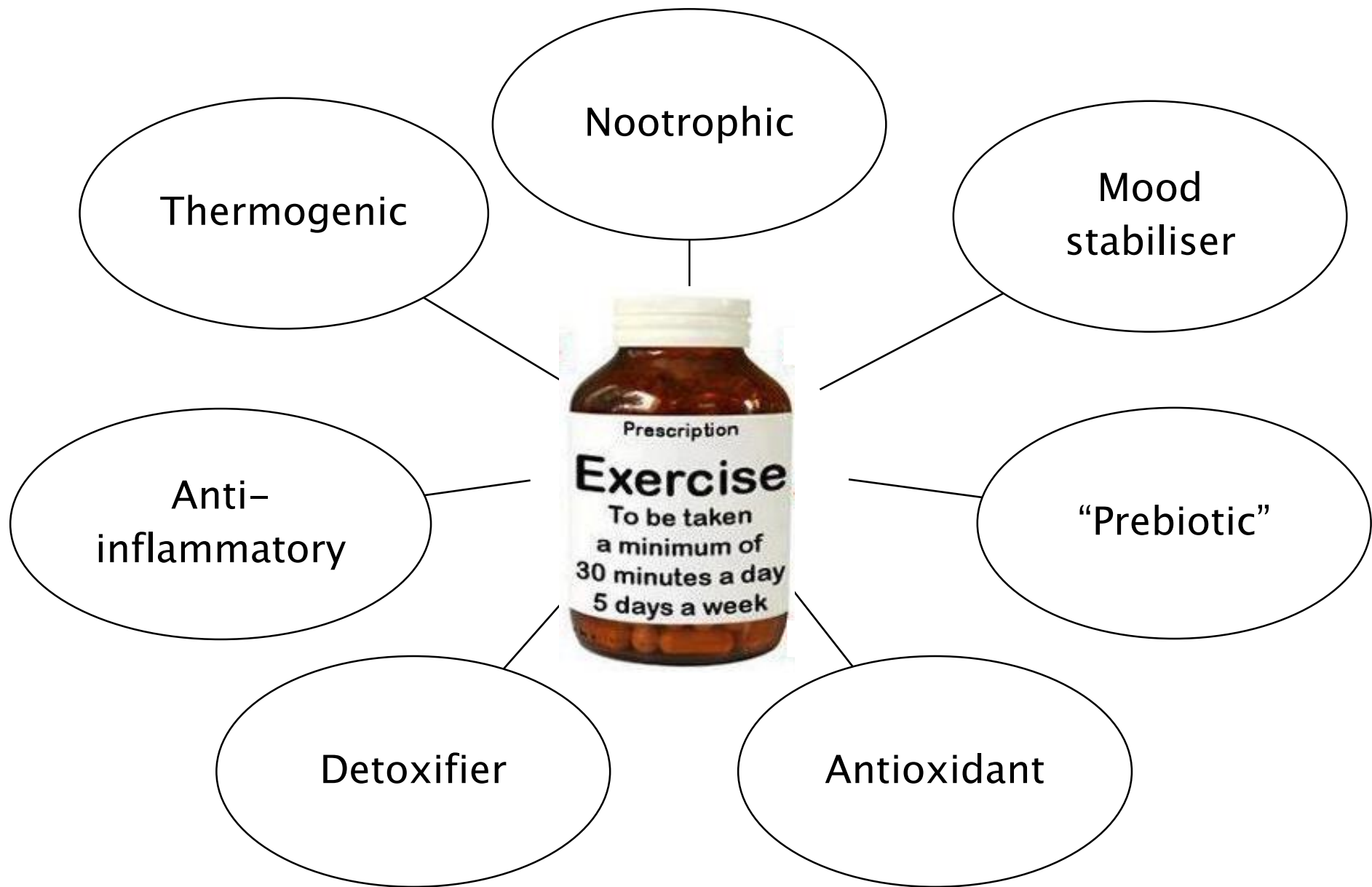
Fletcher R, St. George J, Freeman E, Rough and tumble play quality: Theoretical foundations for a new measure of father-child interaction., *Early Child Devel & Care*, 2013;183 746-75



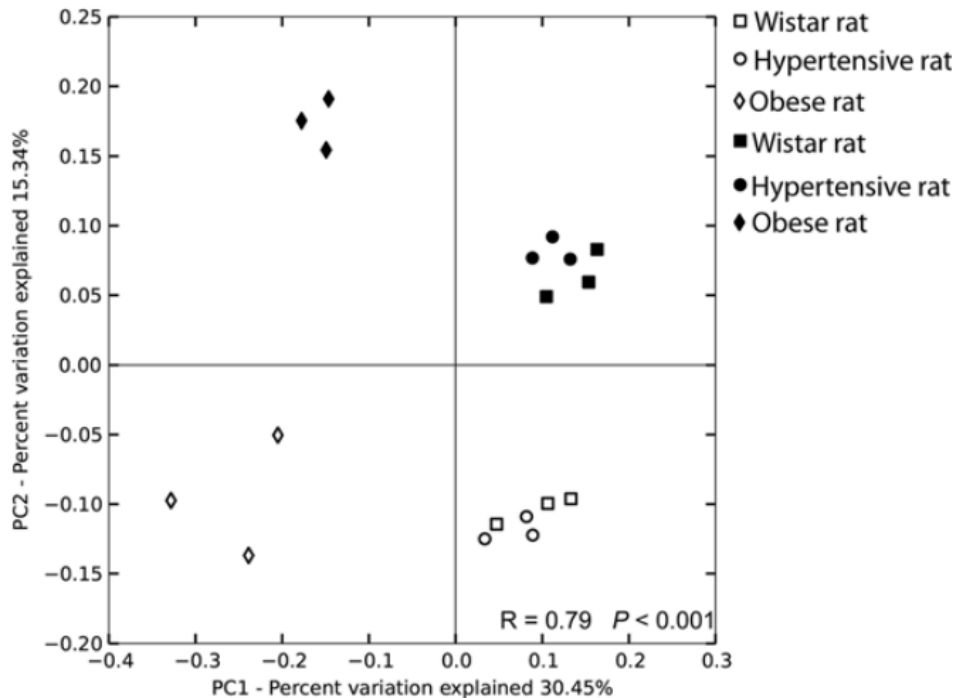
# GO AND PLAY OUTSIDE! - IT IMPROVES YOUR MICROBIOTA



Rook GA. Regulation of the immune system by biodiversity from the natural environment: an ecosystem service essential to health. Proc Natl Acad Sci U S A. 2013 Nov 12;110(46):18360-7.



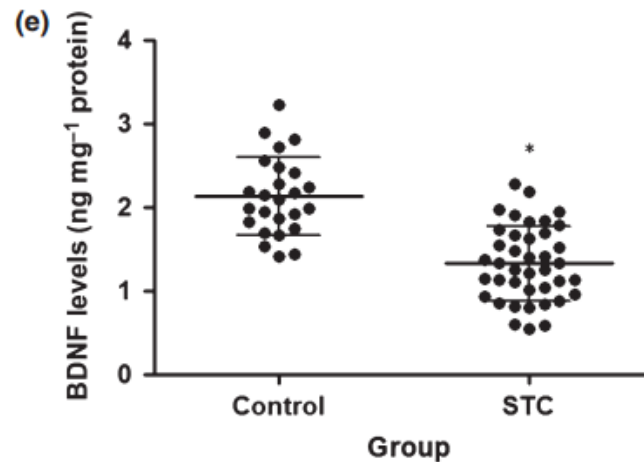
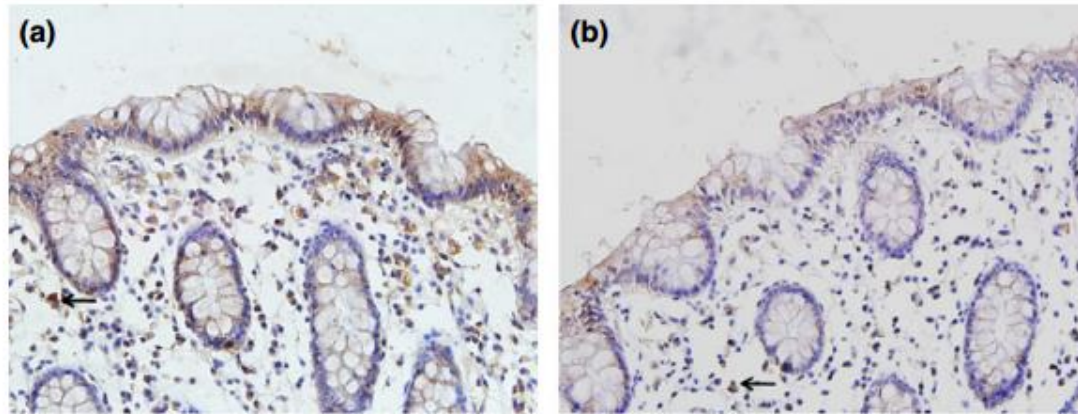
# EXERCISE INCREASES MICROBIOTA DIVERSITY



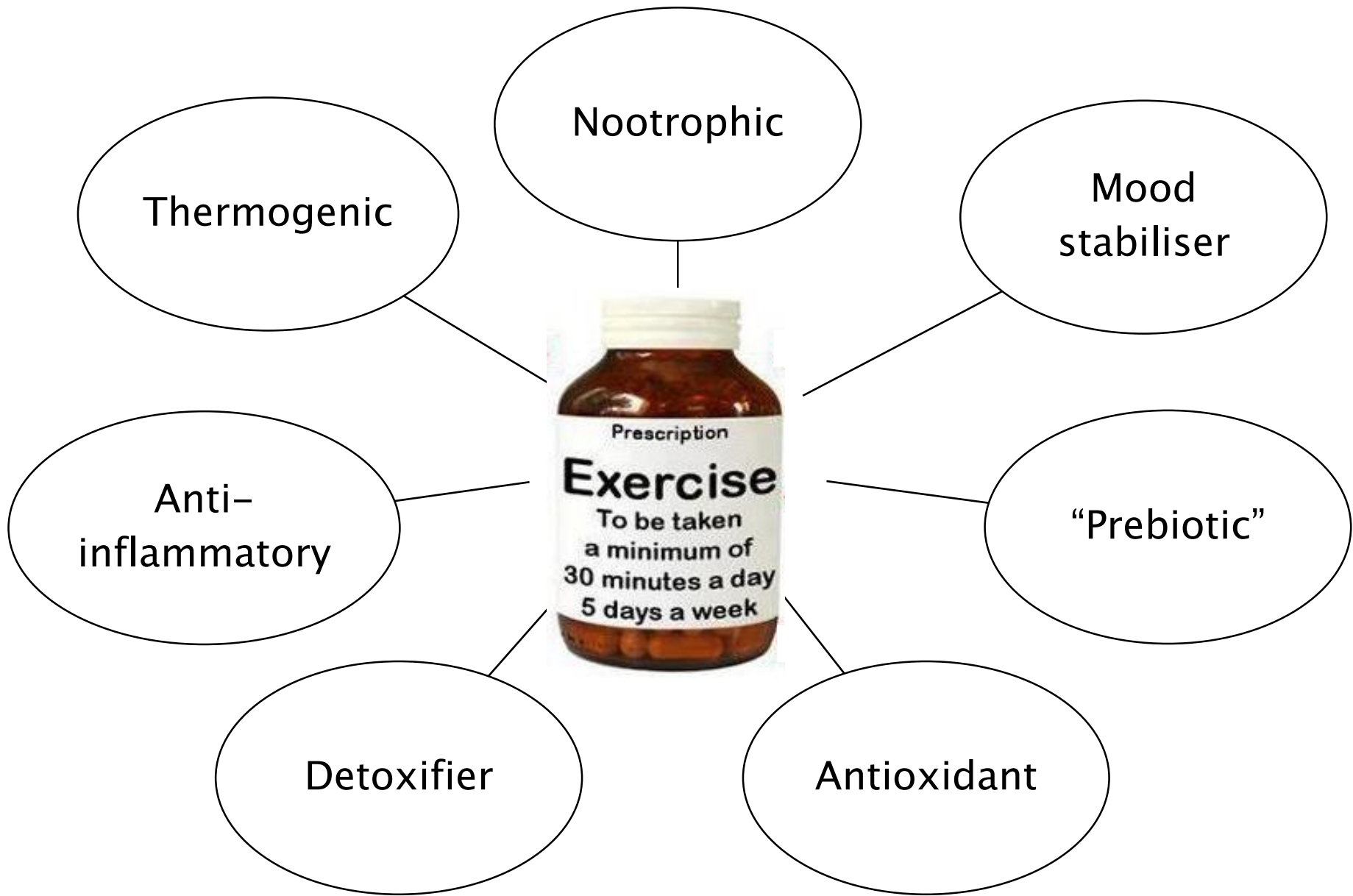
- Exercise altered the composition and diversity of gut bacteria at genus level in all rat lineages.
- Exercise training alters gut microbiota from an obese and hypertensive genotype background.

Petriz BA, et al. Exercise induction of gut microbiota modifications in obese, non-obese and hypertensive rats. BMC Genomics. 2014 Jun 21;15:511.

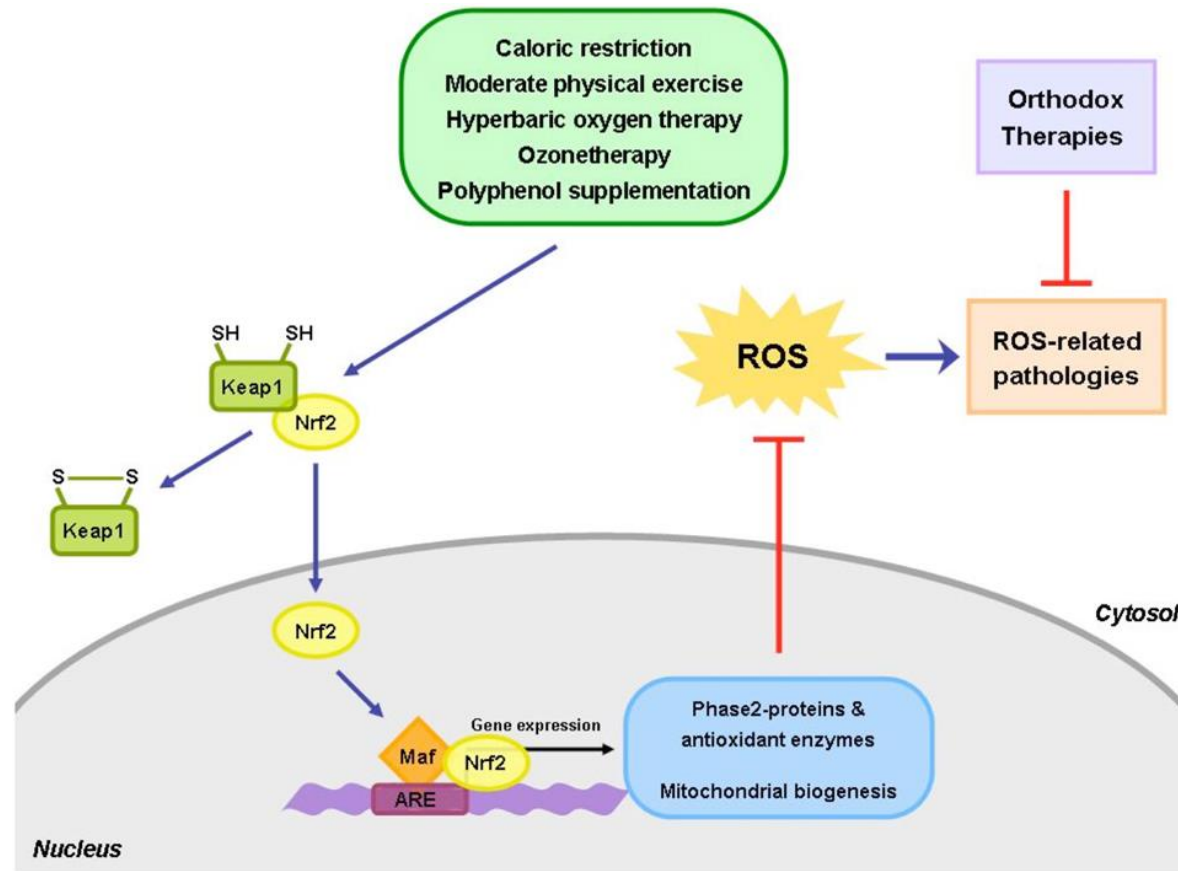
# BDNF INCREASES GUT MOTILITY, LOW LEVELS IN CONSTIPATION



Chen F, et al. Brain-derived neurotrophic factor accelerates gut motility in slow-transit constipation. *Acta Physiol (Oxf)*. 2014 Nov;212(3):226-38.



# EXERCISE ACTS AS 'HORMETIC' STRESS



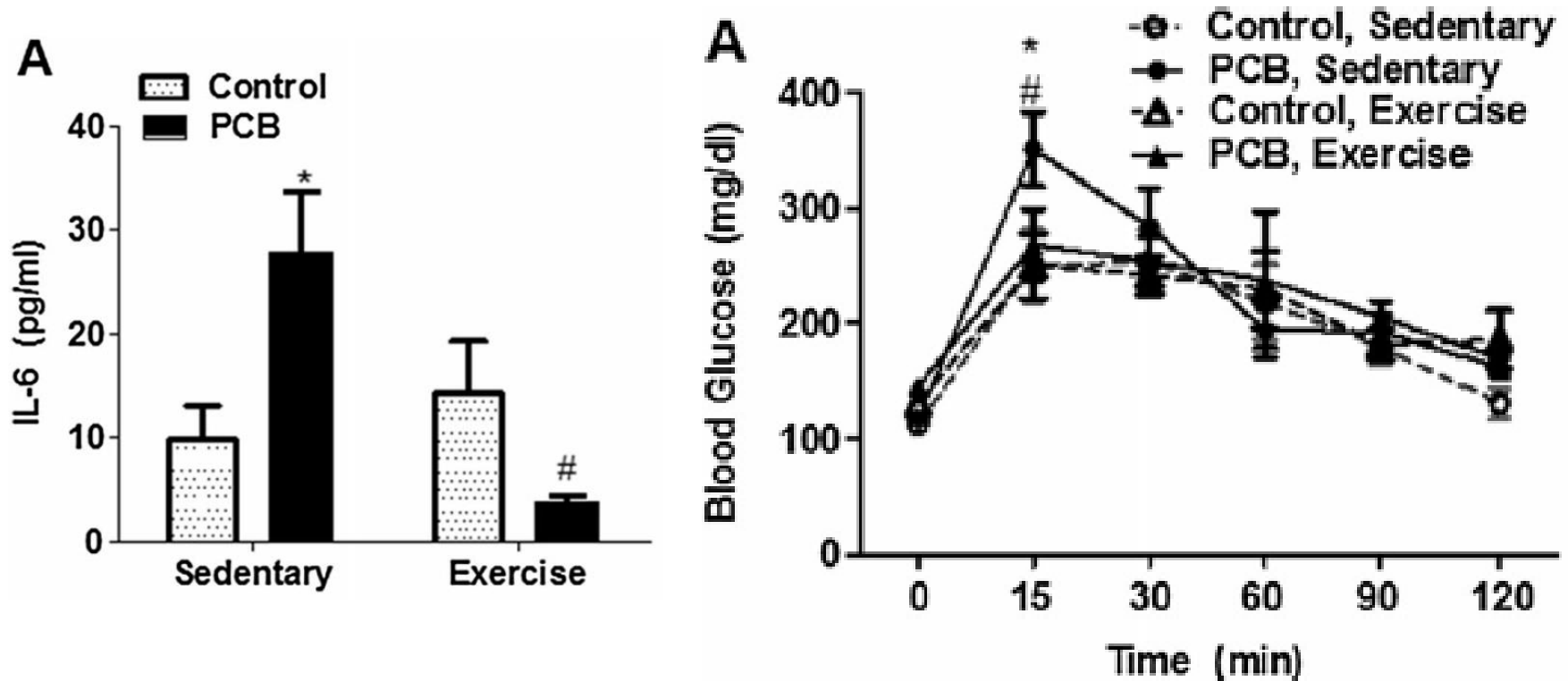
Bocci V, Valacchi G. Nrf2 activation as target to implement therapeutic treatments. Front Chem. 2015 Feb 2;3:4.

# EXERCISE MAY BE A KEY SAFEGUARD AGAINST ENVIRONMENTAL TOXICITY

Noting that regulation of persistent organic pollutants (POPs), while critical, has provided insufficient protection because POPs persist in human bodies and the food chain, advantageous hormetic stressors, such as moderate exercise, phytochemical intake, and calorie restriction should be used by the public to mitigate glutathione depletion and mitochondrial dysfunction due to POPs.

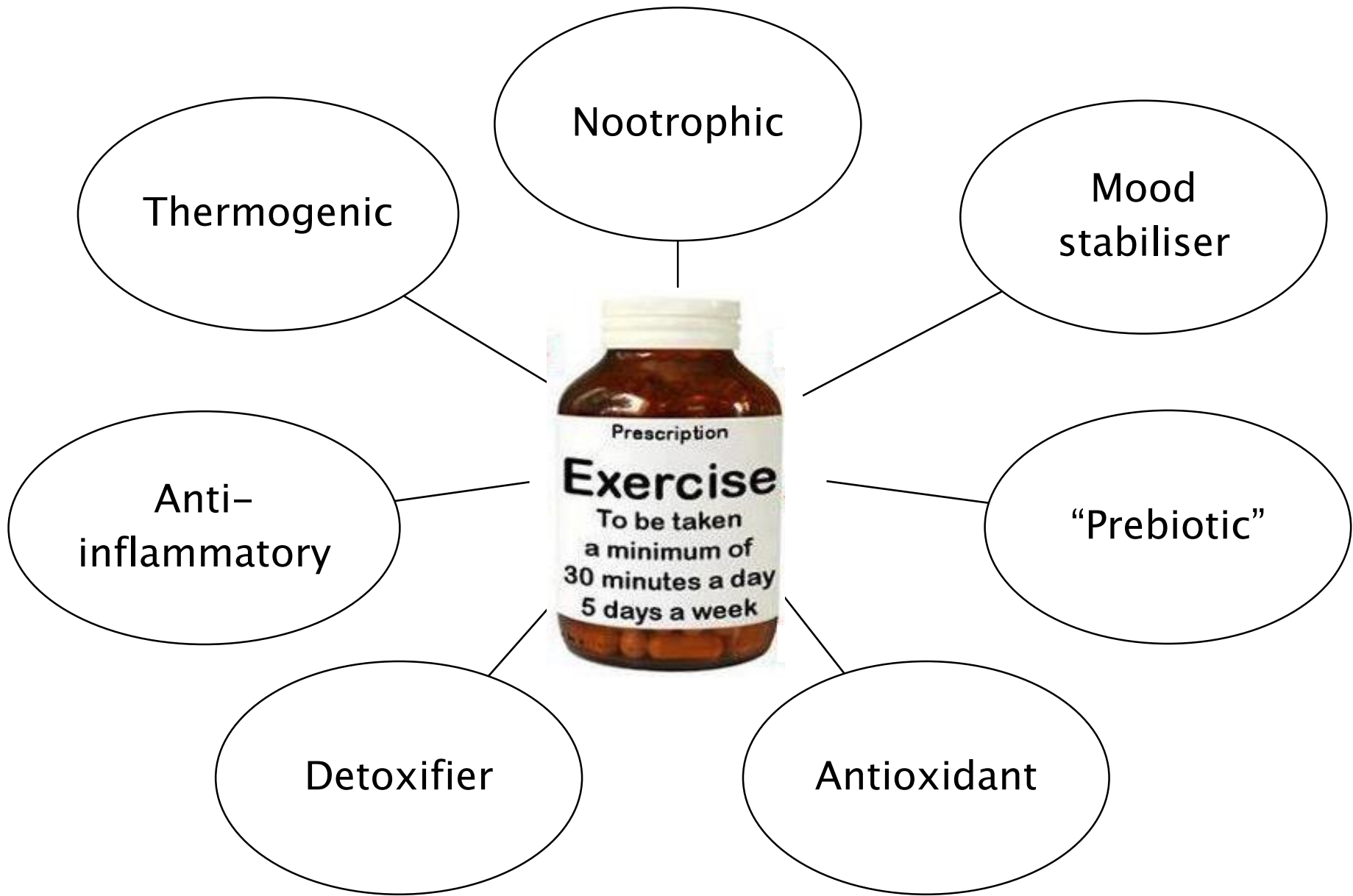
Lee DH, Jacobs DR Jr. Hormesis and public health: can glutathione depletion and mitochondrial dysfunction due to very low-dose chronic exposure to persistent organic pollutants be mitigated? *J Epidemiol Community Health*. 2015 Mar;69(3):294-300.

# EXERCISE OFFSETS PCB-INDUCED INSULIN RESISTANCE



Murphy MO, et al. Exercise protects against PCB-induced inflammation and associated cardiovascular risk factors. *Environ Sci Pollut Res Int.* 2015 Jan 15. [Epub ahead of print]





# PRACTICAL IMPLEMENTATION



# BE THE CHANGE YOU WISH TO SEE IN THE WORLD

Children of active mothers were 2.0 times as likely to be active as children of inactive mothers, whereas children of active fathers were 3.5 times as likely to be active as children of inactive fathers.



Moore LL, et al. Influence of parents' physical activity levels on activity levels of young children. J Pediatr. 1991 Feb;118(2):215-9.

# CHILDREN'S ACTIVITY NEED TO BE MORE THAN ORGANISED SPORT



- Active play
- Active transport
- School activity
- Family-orientated physical activity
- Everyday incidental activity (e.g. chores)

[www.activehealthykids.com.au](http://www.activehealthykids.com.au)

# APPS AND DEVICES TO PROMOTE CHILDREN'S PHYSICAL ACTIVITY



Free [Download](#)

## Jump Jump Froggy

Jump Jump Froggy encourages a healthy dose of daily exercise



Free [Download](#)

## Super Stretch Yoga HD

Handy video app for kids of Twelve Yoga poses with a fun animal theme



\$2.99 [Download](#)

## FitnessKids

Exercise and activity app for kids that offers training and competition, in groups or alone.



\$2.99 [Download](#)

## Learn Gymnastics for Kids

Video textbook to teach kids from a young age about the sport of Gymnastics



\$2.99 [Download](#)

## C-Fit XTrain - Classroom Fitness

Video app geared towards sets of fitness activities



# IF YOU CANT BEAT 'EM, JOIN 'EM

RESEARCH ARTICLE

Open Access

## Virtually impossible: limiting Australian children and adolescents daily screen based media use

Stephen Houghton<sup>1\*</sup>, Simon C Hunter<sup>2</sup>, Michael Rosenberg<sup>3</sup>, Lisa Wood<sup>4</sup>, Corinne Zadow<sup>1</sup>, Karen Martin<sup>4</sup> and Trevor Shilton<sup>5</sup>

### Abstract

**Background:** Paediatric recommendations to limit children's and adolescents' screen based media use (SBMU) to

### Research Article

## A Randomised Control Trial of the Impact of a Computer-Based Activity Programme upon the Fitness of Children with Autism

**Kathleen Dickinson and Maurice Place**

School of Health and Life Sciences, Northumbria University, Coach Lane Campus, Newcastle Upon Tyne NE7 7XA, UK

Correspondence should be addressed to Maurice Place; maurice.place@northumbria.ac.uk

Received 11 July 2014; Revised 16 August 2014; Accepted 7 September 2014; Published 7 October 2014

Academic Editor: Manuel F. Casanova

Copyright © 2014 K. Dickinson and M. Place. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.





# GREEN TIME VS SCREEN TIME

<http://www.natureplaywa.org.au/resources/green-time-vs-screen-time>

