

ADHD, environment, lifestyle: A primer on the latest findings in complementary, alternative, lifestyle, and technology-related effects and treatments for ADHD



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CHADD ADHD General Session
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DISCLOSURES

- Royalties from Guilford Press
 - Getting Ahead of ADHD (2017)
 - Source of some material today's talk
 - What Causes ADHD (2007)
- No commercial or industry affiliations.
- All work supported by
 - NIMH R01MH59105, other NIH grants
 - unrestricted philanthropic gifts.

“lifestyle” is a complicated inter-related concoction today



Today's outline

- Diet
- Exercise
- Stress and Trauma
- Technology
- New tech-based treatments: update
- Synergy/conclusions

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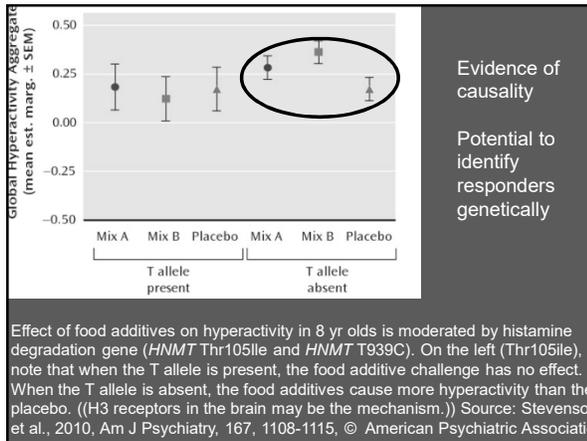
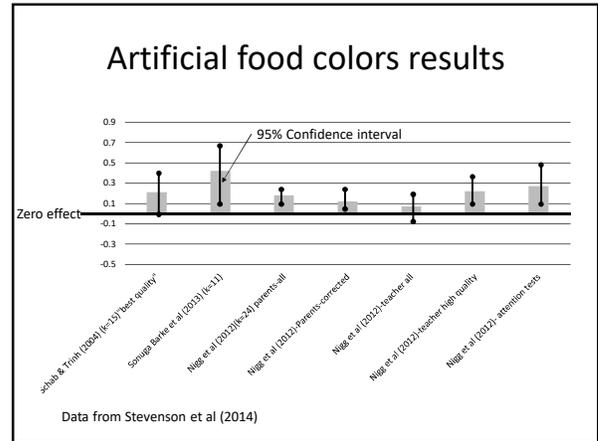
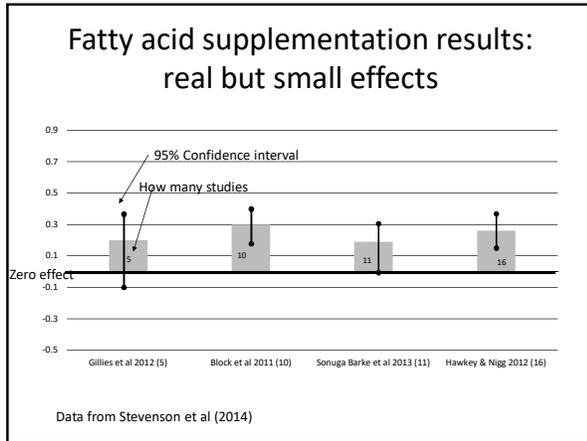
Dietary interventions

- Single nutrient supplements
- Multi-nutrient supplements
- Restriction and elimination diets

Diet and ADHD: Basic concepts

- The brain is mostly fat
 - Value of more long chain fatty acids may or may not depend on deficiency
- Brain signaling requires adequate balance of micronutrients—zinc, iron, and others
 - Value of these likely depends on deficiency
- Hard to establish effects in ADHD but they are now demonstrated
- Effects are fairly small on average suggesting variation in response—some kids large response, some little response

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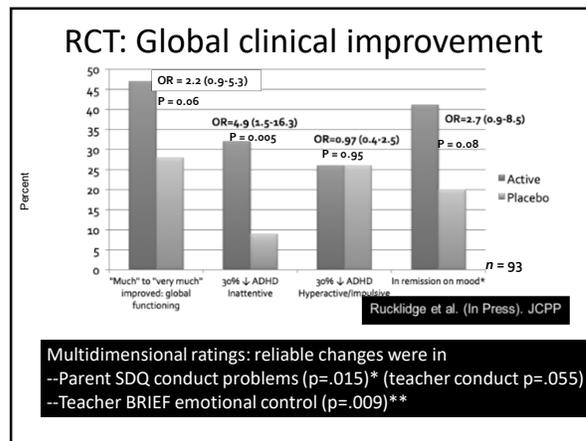
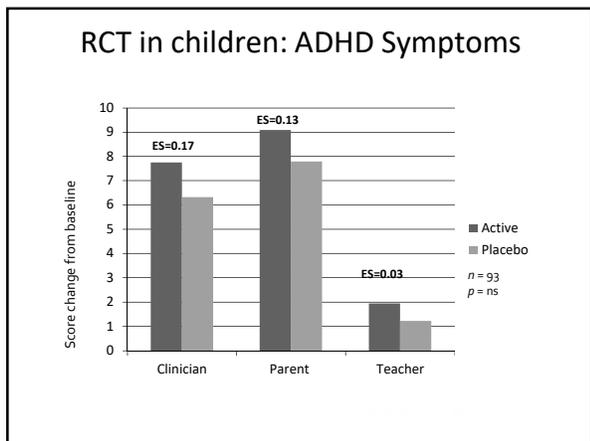


Elimination diet % responders (Controlled trials in red)

Source	Criterion	N	Rate (%)	LL(%)	UL(%)
Open label (k=14)	Various	2025	47%	33%	62%
Conners et al 1978	25%	15	26.7%	10.4%	53.3%
Williams et al 1978	33%	24	19.2%	8.2%	38.7%
Harley et al 1978	10%	23	22.8%	12.6%	37.8%
Kaplan et al 1989	25%	24	41.7%	24.1%	61.7%
Schmidt et al 1997	100%	49	24.5%	14.5%	38.3%
Pooled Weighted average controlled trials	Various	135	26.4%	20.0%	34.1%

Source: Nigg et al 2012; Nigg & Holton 2014

- ### What is in a broad-spectrum micronutrient formula?
- Vitamins: A, C, D, E, B₁, B₆, K
 - Minerals: Calcium, Iron, Phosphorous, Iodine, Magnesium, Chromium, Molybdenum, Potassium, Zinc, Selenium, Copper, Manganese, Vanadium, Boron, Nickel, Lithium
 - Amino acids: dl-Phenylalanine, acetyl-L-carnitine, L-methionine, N-acetyl-cysteine
 - Herbs: Grape seed, Ginkgo biloba
 - Alpha-lipoic acid



Conclusions on Diet

- Some dietary interventions have promise as ancillary treatment
- Effects too small to be stand alone for most kids
- May benefit only a minority of ADHD
- May benefit more on mood/irritability, secondarily inattention

Action Plan: Food

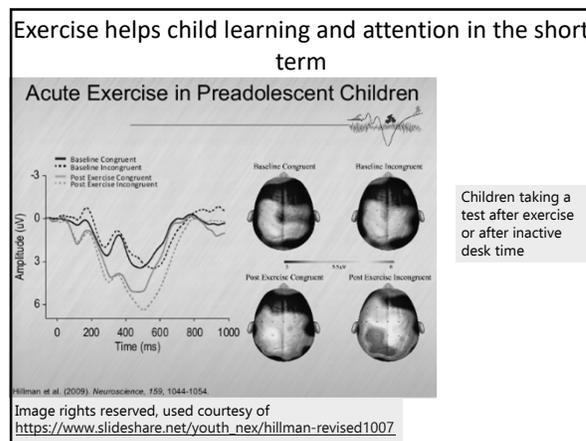
- Evaluate how much effort you can do—start easy
- **Low level:**
 - Shop outside aisles (fresh, less processed)
 - Supplement w oily fish (salmon, mackerel, sardines, herring)
 - OR fish oil supplements (1000 mg EHA/DPA)
 - OR algae-based omega 3 supplements
 - Eliminate caffeine (e.g., sports drinks) for children
- **Mid and moderate level**
 - Check blood levels iron, vitamin D, omega3
 - Eliminate 6 allergenic foods on trial basis
 - Eliminate added sugar (e.g., boxed, canned foods)
 - Provide only healthy food choices (re-stock)
- **Ambitious (cost more, may need dietician consult)**
 - Eliminate food additives, eat organic/fresh
 - Restriction /elimination diet (get clinical supervision, behavioral counseling plan)

SOURCE: Nigg (2017), Getting Ahead of ADHD; slide © Joel T Nigg, 2018; <https://joelniggphd.com/>

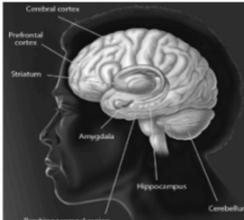
Exercise: what we now know

- Acute exercise improves attention, learning-even after 20 minutes in typically developing individuals
- Sustained exercise reverses epigenetic harms of stress and trauma in animals
- Sustained fitness improves brain growth, connections, efficiently even after a few weeks
- Effects in animals are most clear in brain areas and skills related to learning, attention: suggesting promise for ADHD recovery
- But studies of ADHD are too limited to give clear answer on ADHD per se
- Exact type of exercise? Maybe benefit from complex motivating real-world and aerobic context (e.g., basketball, karate, dance) or motivation/fun (training for an event)

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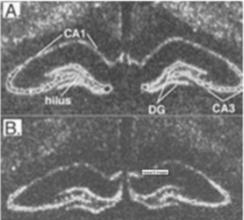


Fitness training increases neurogenesis



Exercise increases 'neurogenesis' (growth of neurons) in the hippocampus - a region important for memory and implicated in cognitive aging.

Proc. Natl. Acad. Sci. U.S.A. 104(17):5638-43 (2007).



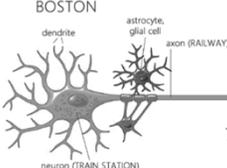
Warmer colours indicate higher levels of nerve growth factor in the hippocampus of [A] exercising animals compared to [B] sedentary animals - blue indicates the lowest level.

Image: <https://www.slideshare.net/insidethebrain/brain-motion-and-emotion>; rights reserved

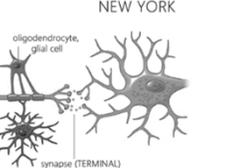
Pre fitness: Enhanced brain development schematic

Brain areas

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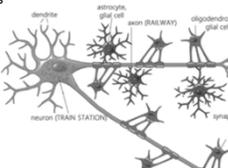


http://www.bodbot.com/Cognitive_Health.html; image rights reserved

With fitness: Enhanced brain development schematic

Brain areas

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Exercise: Action plan

- Take hope: even biological effects may change
- No down side: exercise improves health, mood
- Goal
 - 1 hr. per day
 - moderate-to-vigorous
 - at least 15" blocks
 - Doesn't have to be a sport, can be free play too
 - Vary the activity
- Experiment to find an exercise option that 'works' for your child and family and is fun
- Accept what is realistic: some is better than none!

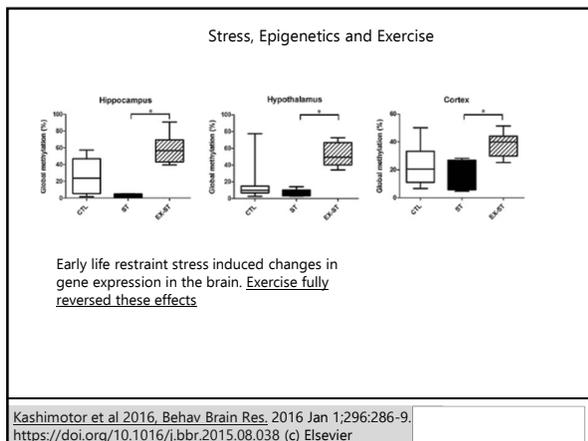
SOURCE: Nigg (2017), *Getting Ahead of ADHD*; slide © Joel T Nigg, 2018; <https://joelniggphd.com/>

Stress Management: Stress and Trauma Definitions

- Positive stress
 - Challenge but I think I can meet it
- Negative stress
 - Daily hassles
 - Major negative events
- Traumatogenic context /expressed emotion/
- Frank emotional trauma
 - Fear of serious injury or death (need not be "realistic")
 - Seeing someone severely injured or killed
 - Unforgettable blow to understanding of self or loved ones
- Effects on inflammation, HPA axis, brain development, epigenetic changes

Negative Stress/ Trauma "triple threat" in ADHD

- More likely to experience stressful and traumatic event (THOUGH MOST DO NOT)
 - Judgement, social skills, impulsivity
- More likely to develop PTSD when exposed
 - ADHD thus has above chance overlap with PTSD
- Less prepared to cope
 - Less emotion regulation skills
 - Less social support



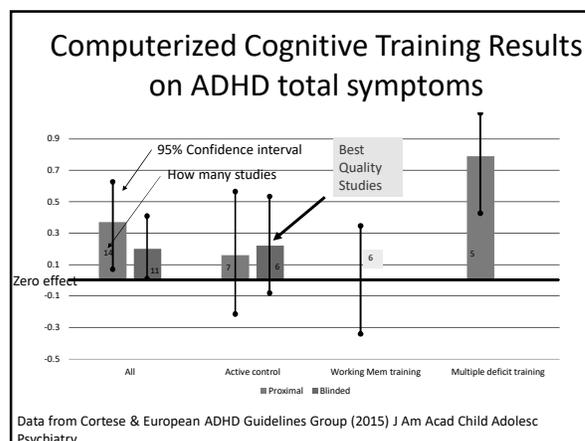
- ### Game plan for stress and trauma
- Recognize the potential (clinicians, families)
 - Build social support (mentor, friend, church)
 - Reframing, coping, resilience
 - Exercise
 - Reduce high intensity communication in home
 - Manage personal trauma/stress history
 - Trauma specific counseling—correct assessment

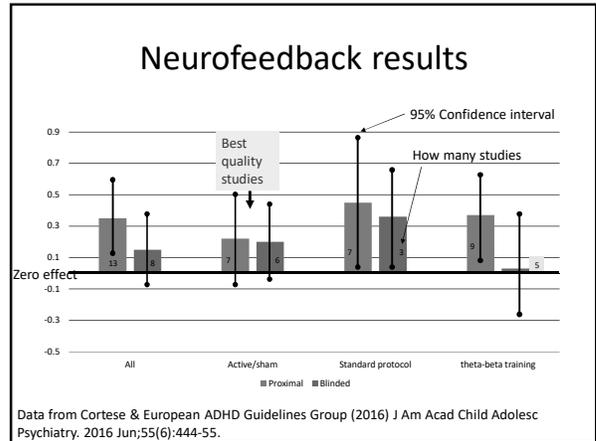
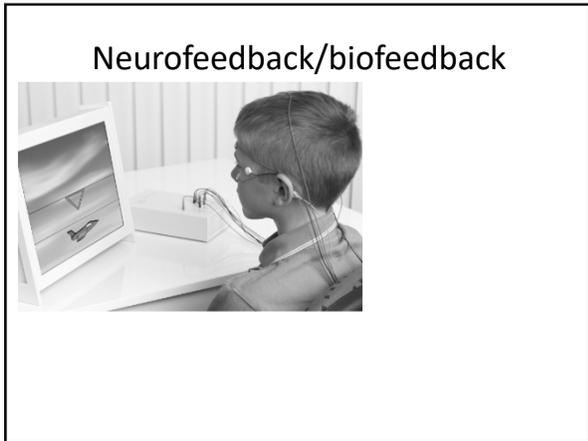
- ### Social media, gaming, internet and ADHD
- What we know
 - Link of violent media/gaming content to aggression
 - What emerges on preliminary evidence
 - “Excess use” social media linked to negative mood, depression
 - Global use linked to inattention but small effect and weak studies
 - Internet—risks of impulsivity, social need, vulnerability—parental monitoring is key
 - Latest developments: Gaming disorder-WHO and DSM

- ### Game plan for technology
- Teach your child safe internet and social media use
 - Monitor use and content(disengagement=risk factor, can be non-judgmental)
 - Redirect if signs of aggression /depression/irritability
 - Limit before bed use (blue light)
 - Negotiate limited hours
 - Leave time for exercise, social activity, study, sleep
 - Recognize for some gamers it is their social world
 - Identify addictive like behavior and seek counseling

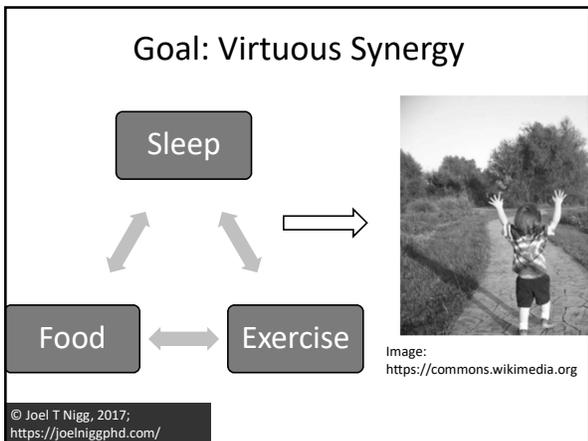
Computerized cognitive training

Theory and History
Types
Controversy





- ### Interim summary on new treatments
- Computerized cognitive training—not yet ready
 - But more complex, emotionally engaging tools may yet prove beneficial
 - Other cognitive challenge, e.g., chess, may equal
 - Neurofeedback—still not proven.
 - But new trials are in the works with refined methods. Stay tuned
 - Direct brain stimulation: avoid for children for now.
 - But exciting long term prospects. May help adults with depression.



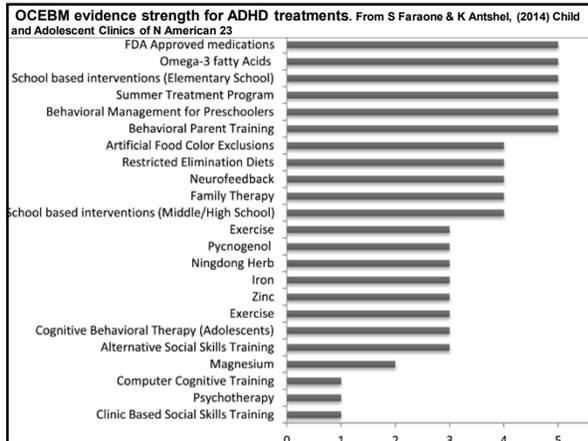
Size of effects (d)

- ES=-0.1: Total TV and video effects on attention/ADHD symptoms
- ES=-0.2: omega 3 supplementation ADHD (Hawkey & Nigg 2012); food additives-ADHD ~ USA girls' height from age 15-16
- ES=-0.3: Lead level and ADHD-(Goodland et al 2013); second hand smoke and cancer
- ES=-0.5: Violent video/TV and child aggressive behavior (Anderson, 2004)
- ES=-0.6: ADHD—aerobic exercise (Vysniauskis et al 2016) ~ USA girls' height from age 14-18
- ES=-0.85: smoking and lung cancer
- ES=-1.0: ADHD-medication benefit ~ USA girls' height from age13-18

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Schematic illustration of group difference and overlap effect size 0.7

Ranges of Test Scores in Formative Assessment Experiments



What you can do: key areas of effective lifestyle for ADHD

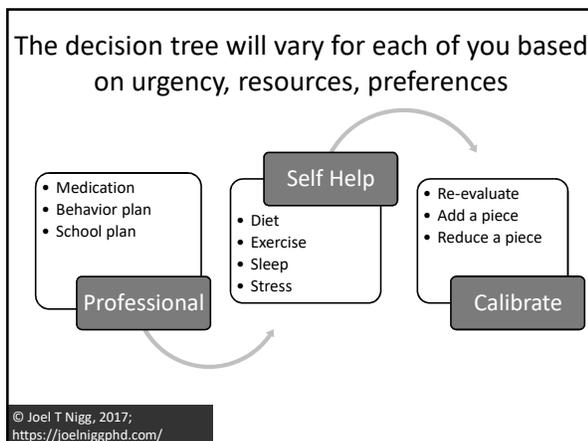
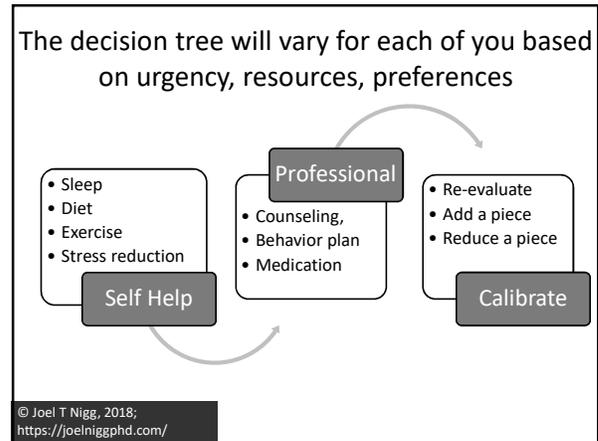
- Exercise—daily for child
- Sleep—address sleep issues
- Diet/supplementation
- Technology—harms and potential benefits
- Stress/adversity—manage family stress

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Decision Flow chart can be used

- Consider level of urgency/severity
- Secondary symptoms
- Your resources, capacity
- Then sequence, blend of
 - Standard treatments (medication, behavioral guidance, tutoring)
 - complementary/alternative steps, often at home

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Summary and Conclusions

- Balancing mainstream professional and “alternative” lifestyle steps makes sense in light of emerging science
- Individualized, personalized approach needed: Create a plan that works for your family
- If your at home plan doesn’t work, get a pro to troubleshoot

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