HANDOUT

Can computers train attention at school? Impact of Computer Cognitive and Neurofeedback Training on Childhood attention and ADHD

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Disclosure: Naomi Steiner, MD is founder and CEO of Attention Tutoring (www.AttentionTutoring.com), which -1- trains attention through neurofeedback, -2- trains organization and executive function skills through a curriculum amended for individual needs, and -3- trains relaxation breathing (biofeedback)

ADHD: the traditional approach

- Clinician-based
- Medical diagnosis / treatment (psychotropic medication have side effects that have to be tracked)
- With parent and teacher consult
- Questionnaires (ADHD rating scales)

Computer attention training:

When technology meets neuroscience
When does it integrate clinical practice?
Where does it fit into the traditional approach?

Efficacy of two computer-based attention-training systems (Steiner et al, 2014, Pediatrics)

- Neurofeedback
- Cognitive Attention Training

Intervention 1: Neurofeedback [EEG Biofeedback]

EEG sensors detect brainwave activity
Theta/Beta training
References: Banaschewski and Brandeis, 2007; Heinrich et al., 2007; Sherlin et al., 2012; Arns, 2014 for a review.

Intervention 2: Cognitive Attention Training

Interactive computer tasks
Not regular video games
Cognitive exercise program aimed at training attention
With immediate feedback
Children progress to higher levels
References: Klingberg 2002, 2005, 2007; Tang 2009

Review of study design, recruitment, setting, inclusion / exclusion criteria, results
- Growth model: significant improvements in the neurofeedback group over the three time points.

Medication Status
- Children can benefit from neurofeedback training regardless on/off medication

Future Directions
- Look at moderating and mediating factors
- IEP status, IQ, age, SES status
- Academic results (distal outcome measures)
- Include middle schools and high schools

What does this mean today for clinical practice?
- Results consolidate other neurofeedback research studies
- Improvement in executive function skills. Widening and updating the ADHD concept.
- Neurofeedback and cognitive training will continue to adapt to other settings (school)
- No side effects – do we need a diagnosis to train attention / executive functions?
- Function / improvement in function becomes important
  - References: Gevensleben et al., 2009a; Landers et al., 1991
- Brain plasticity
- Attention and organization / executive functions as a spectrum

Other non-traditional approaches
- Yoga, exercise (Jensen 2004, Haffner 2006, Peck 2005, Goldbeck 2003, Steiner 2012)
- Relaxation response / Biofeedback
  - Biofeeback – slows and deepens the breathing
  - HRV – Heart rate variability
  - Relaxation response: sympathetic → parasympathetic
  - Preparing the brain to focus
  - Power of being calm
  - Decreasing arousal → supports focus
  - Using my breathing to focus

Teach skills and change the brain through brain plasticity
Daily function versus DSM criteria
Open-minded towards other approaches is required and further rigorous RCTs

Presentation followed by live demonstration of neurofeedback and Q&A