**Background**

Children with ADHD and/or learning disabilities often show difficulties appropriately allocating their attention. One way that attention allocation is indexed is through event-related potentials (ERPs) recorded during an auditory selective attention task.

Selective attention effects are reduced in children from lower SES backgrounds and in children with specific attention task.

**Methods**

**Participants:**
- 18 male adolescents aged 13-16
- 15 with comorbid learning disability and ADHD
- 3 with a learning disability and no ADHD

11 treatment participants and 7 wait-list control participants

Tested at 6 week intervals

**Selective auditory attention task:**
- Two digitized sounds (200 ms beeps) presented dichotically
- 1000 Hz (88% probability, nontarget) and 2000 Hz (12% probability, target)
- Approximate rate of 1 per second with a variable ISI of 600 to 800 ms randomized across ears
- Instructed to attend to one ear only and to ignore all sounds presented to the other ear
- Responded by pressing a number on a key pad when they heard the target tone in the attended ear
- Four blocks of 200 trials each

**Integra Mindfulness Martial Arts (MMA) treatment program:**
- 20 weekly 90 minute sessions
  - Each session began with a brief sitting meditation and a lesson on a therapeutic skill (e.g., everything changes, nothing stays the same)
  - Followed by a yoga warm-up and mixed martial arts practice
  - Given worksheets and CDs which guide them through a meditation to complete at home

**EEG Recording and analysis:**
- 64 channel BioSensormed net
- Data referenced offline to the average of all sites, pruned to exclude any periods of off-task time (e.g., breaks) and any excessively noisy channels and subjected to an extended infomax independent components analysis (ICA: [8, 9]). Data were filtered (1-35 Hz) and all independent components representing eye movements, heart rate, or other muscle activity were removed.
- Independent components were clustered based on time-frequency decompositions as well as topographies

**Results**

- Treatment, but not control participants, maintained higher ITC to AT than UT stimuli across the three testing sessions, while control participants appeared to habituate to the task
- Many of these effects are significant at the p < .001 level

**Conclusions**

- MMA training successfully maintained ITC recorded during a selective auditory attention task over repeated task administration, compared to controls
- Effects restricted to early time windows and the theta frequency range
- Results consistent with finding that occipital theta ITC is increased to attention-grabbing pseudo words as compared to real words [12]
- MMA participants therefore benefitted by maintaining consistent attention to tones over each testing session
- Posterior IC effects, although we are currently investigating these effects in other, more traditionally related to self-regulation, networks (e.g., PFC)
- Frontal midline theta thought to reflect alternate activities of ACC and superficial PFC, [13] while the interpretation of posterior theta is less clear

**References**