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Executive Functioning Early Intervention: How Cognitive Training Can Serve Long-term Benefits for Children with ADHD

Children diagnosed with ADHD in their early school days fall below average on tasks that require problem solving and effortful-control (Steele et al. 2013; Kofler et al. 2018). These children lack control of their executive functioning (EF), a set of skills that require higher-order processing in the prefrontal cortex (PFC), causing them to fall behind their peers in school (Rueda et al. 2012; Zelazo 2020). Cognitive training programs that target the improvement of EF in children with ADHD have shown remarkable immediate improvements upon academic and behavioral measures (Kofler et al. 2018; Rueda et al. 2012). This research investigates the long-term benefits of early cognitive training for ADHD and non-ADHD children upon academic, behavioral, and white matter integrity measures.

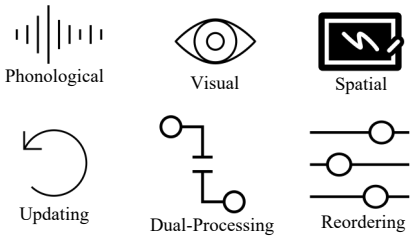
Repeated Measures Between-Subject Design

ADHD

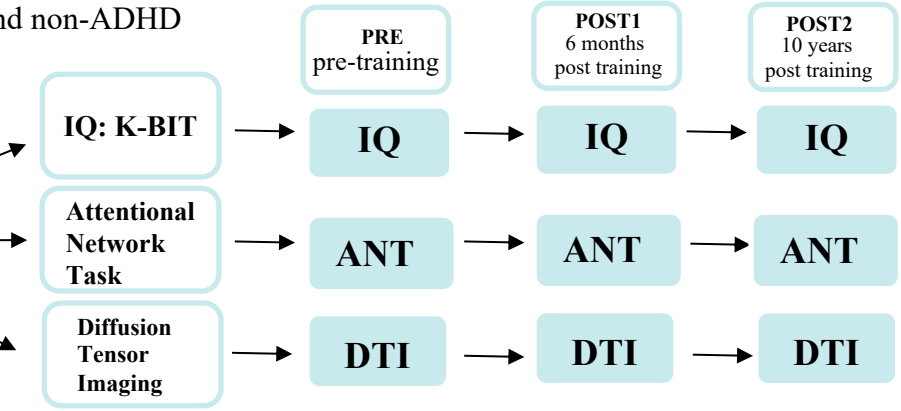
Non-ADHD

IQ: measures verbal and nonverbal skills
ANT: reaction times (RT) measure attention
DTI: fractional anisotropy (FA) measure white matter integrity in PFC

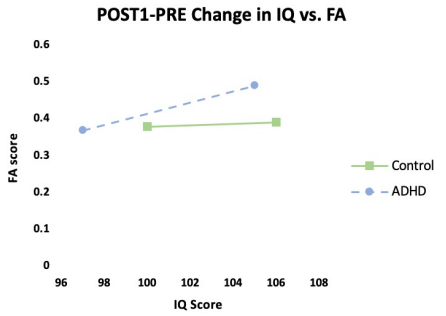
Central Executive Training

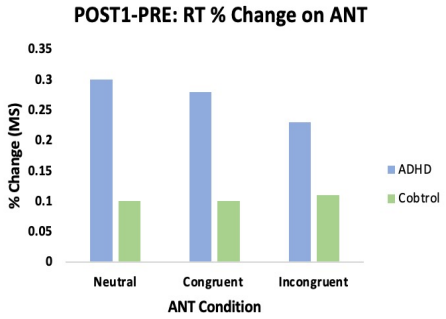


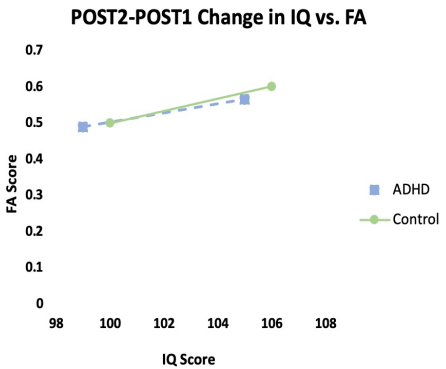
3 Months/9 Training Games

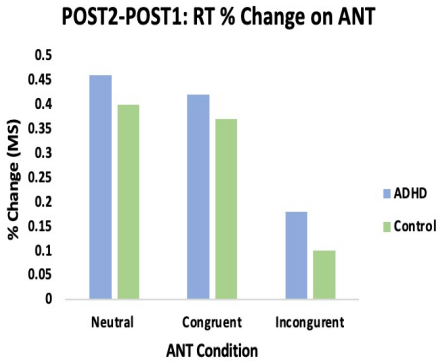


Expected: Long-term benefits of CET for ADHD subjects.









Based on previous studies *Kofler et al. 2018*, we expect to find ADHD decreases in RTs, increases in IQ scores, and greater FA values between sessions. In a Task x Group ANOVA long-term ADHD improvements (POST2-POST1) after CET would show no significant interaction, indicative all groups have similar cognitive abilities (Gordon et al. 2011). However, no long-term ADHD improvements would show a significant Task x Group interaction with smaller ADHD scores POST2-POST1 indicative training fades (Zelazo 2020).

Non-ADHD subjects are also expected to show decreases in RTs, increases in IQ scores, and greater FA values between sessions (Kofler et al. 2018). A significant Task x Group interaction is observed POST1-PRE showing smaller non-ADHD score differences (Bouziane et al. 2018). The larger ADHD score differences POST1-PRE shows that immediate cognitive advancements are greater for ADHD subjects due to activation of novel EF pathways in the PFC (Kofler et al. 2018; Zelazo 2020).

Alternative: No long-term benefits of CET for ADHD subjects.