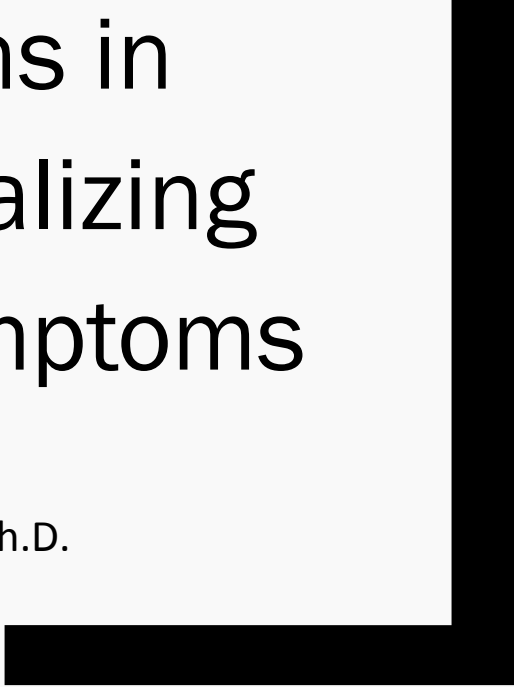


Executive Functions in Children with Internalizing and Externalizing Symptoms

Emily Barnes

Thesis Advisor: Jessica Church-Lang, Ph.D.



Outline

- Key terms: executive functions (EFs), internalizing, externalizing
- Background: EFs in children with ADHD, anxiety, depression
- Research question and hypothesis
- Study design
 - Measures: EF tasks, symptom questionnaires
- Data analysis
- Expected results

Key Terms

- Executive functions (EFs): attentional processes that allow us to problem solve and work toward goals—linked to life outcomes
 - Inhibitory control
 - Cognitive flexibility
 - Working memory
 - Updating
- Externalizing symptoms: behavior problems directed outward toward others, including attention and hyperactivity problems (ADHD)
- Internalizing symptoms: problematic behaviors directed inward toward oneself, including anxiety and depression symptoms



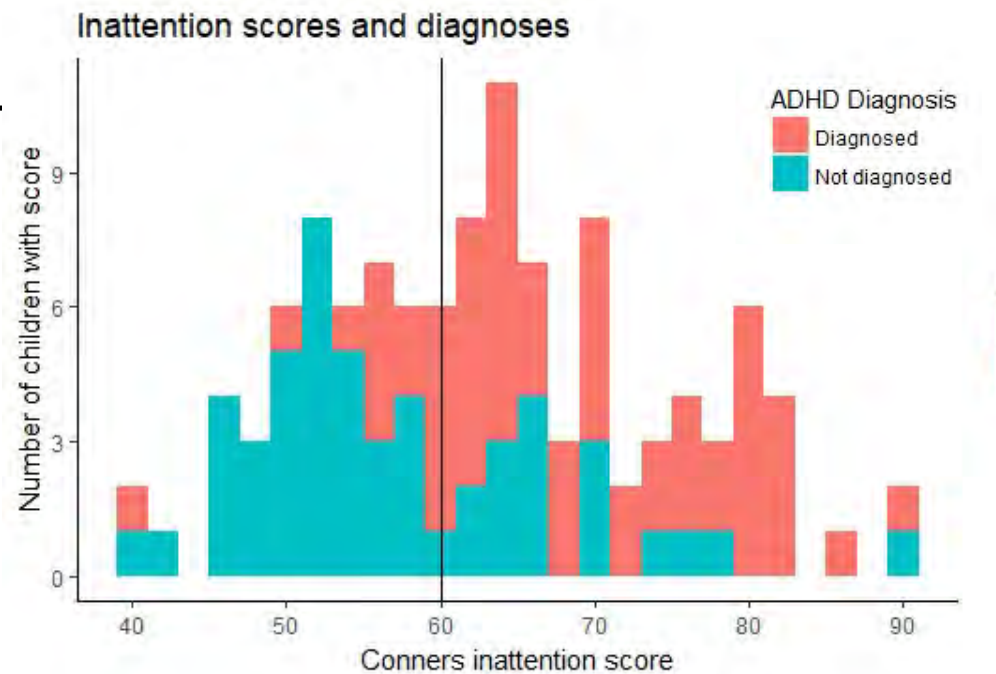
Background

- ADHD is associated with poor inhibitory control and working memory
- Anxiety and depression are associated with poor cognitive flexibility and working memory
- But lots of kids have both ADHD and anxiety/depression
- Studies of children with these comorbid disorders are mixed
 - Some say EFs in kids with ADHD + anxiety > ADHD only
 - Some say EFs in kids with ADHD + anxiety < ADHD only

(Barkley & Murphy, 2010; Alderson et al., 2015; Wilcutt et al., 2005; Ozonoff & Jensen, 1999; Emerson, Mollet & Harrison, 2005; Favre et al., 2009; (Achenbach & Rescorla, 2000; Angold, Costello, & Erkanli, 1999; Yurtbasi et al., 2015; Schatz & Rostain, 2006)

Background

- Why the mixed results?
 - Studies use diagnoses to group kids and study differences between groups, but these groups have some arbitrariness!
 - ADHD is heterogeneous (3 subtypes)
 - Diagnostic criteria evolving and more kids getting diagnosed
- Diagnosis is based on symptoms crossing clinical threshold



This study examines symptom burden (severity and frequency) in relation to EFs, rather than grouping kids by diagnoses

Hypothesis

↑ Internalizing symptoms will predict ↓ cognitive flexibility

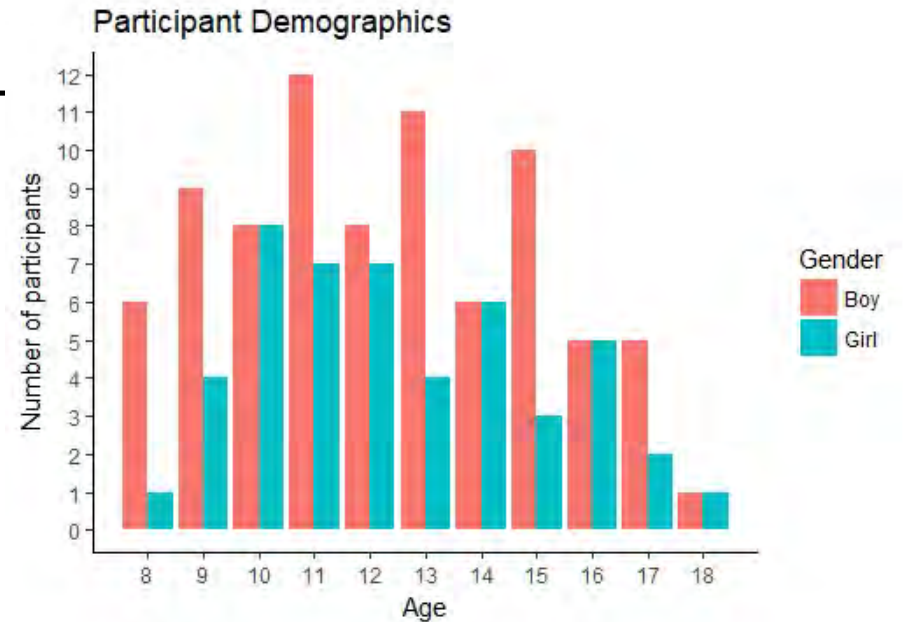
↑ Attention and hyperactivity symptoms will predict ↓ inhibitory control

↑ Internalizing and externalizing symptoms will predict ↓ working memory

- No interactions—effects will be additive in children with high internalizing and externalizing symptom burdens

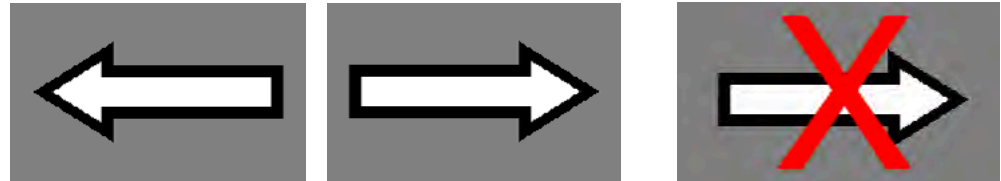
Study Design

- Part of ongoing Church lab study
- 156 children have participated
 - 64 girls, 92 boys
 - 65 children with ADHD diagnoses
 - Ages 8-18 (mean=12.9)
 - 100 families

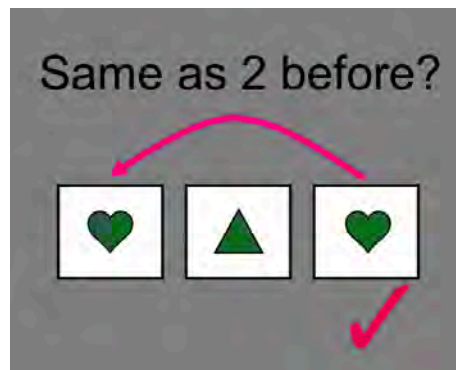
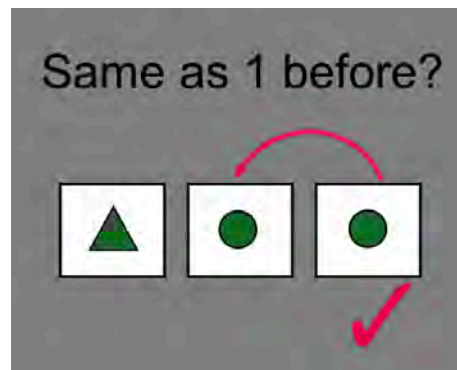
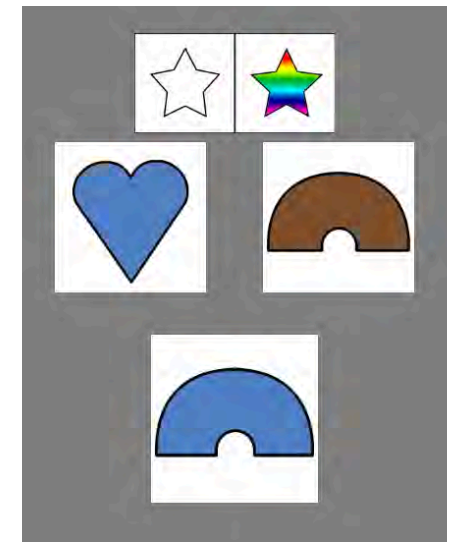
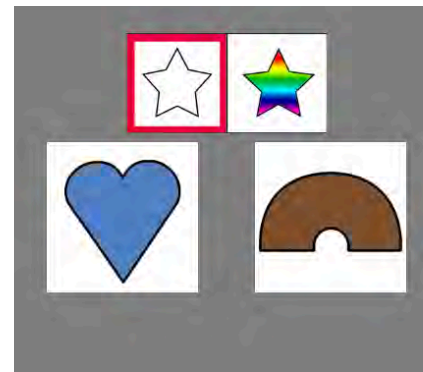


- Measures: scores on computer EF tasks, self-reported internalizing and externalizing symptoms, parent-reported internalizing and externalizing symptoms

EF Measures



- Inhibitory control: Stop Signal Task
- Cognitive flexibility: CogFlex
- Working memory/updating: N-Back



(Verbruggen, Logan, & Stevens, 2008; Baym et al., 2008; Jaeggi et al., 2010)

Child Self-Report Measures

Multidimensional Anxiety Scale for Children

	Never true about me	Rarely true about me	Sometimes true about me	Often true about me
I feel tense or uptight	0	1	2	3
I worry about other people laughing at me.....	0	1	2	3

Conners 3 Self-Report Short

	Not true at all (never, seldom)	Just a little true (occasionally)	Pretty much true (often, quite a bit)	Very much true (very often, very frequently)
I blurt out the first thing that I think of.....	0	1	2	3
It is hard for me to sit still.....	0	1	2	3

Parent Report Measures

Child Behavior Checklist

For each item that describes your child *now or within the past 6 months*, please circle [the appropriate number].

	Not true (as far as you know)	Somewhat or sometimes true	Sometimes true about me
There is very little he/she enjoys.....	0	1	2
Cries a lot.....	0	1	2

Conners 3 Parent Short

Please tell us about *your* child and what he/she has been like in the *past month*.

	Not true at all (never, seldom)	Just a little true (occasionally)	Pretty much true (often, quite a bit)	Very much true (very often, very frequently)
Forgets to turn in completed work.....	0	1	2	3
Fidgets or squirms in seat.....	0	1	2	3

Data Analysis

- Multiple linear regression
 - Predictors: self-reported internalizing and externalizing symptoms, parent-reported internalizing and externalizing symptoms, age, gender, family relatedness, SES, processing speed
 - Predicting: EF factors (one model for each EF factor)
 - Examining which symptoms (if any) are the best predictors for each EF factor

Expected Results

- Higher attention and hyperactivity symptom burdens will predict poor inhibitory control and working memory
- Higher internalizing symptom burden will predict poor cognitive flexibility and working memory
- No interactions; effects of symptom burdens are additive
- *Alternative: attention and hyperactivity symptom burdens predict different EF factors*
- *Alternative: no difference in the best predictors of the EF factors*
- *Alternative: anxiety + attn/hyperactivity > attn/hyperactivity alone*