

## Non-pharmacological Treatment Alternatives for Children with Attention Deficit Hyperactivity Disorder

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## Presentation Outline

- About ADHD
- Nonpharmacological treatments
  - Community Parent Education (COPE)
  - Attention Training – Preschoolers
    - Attention Inhibition and Memory (AIM)
  - Attention Training – School aged
    - Pay Attention!



## Inattention



Some signs of **inattention** are:

- Often becoming easily distracted by irrelevant sights and sounds
- Often failing to pay attention to details and making careless mistakes
- Rarely following instructions carefully and completely losing or forgetting things like toys, or pencils, books, and tools needed for a task
- Often skipping from one uncompleted activity to another.

## Attention Deficit/Hyperactivity Disorder (ADHD)

- DSM-IV Classification
  - Three subtypes
    - **Predominantly Inattentive Type**
    - **Predominantly Hyperactive-Impulsive Type**
    - **Combined Type**
  - Symptoms
    - Developmentally abnormal
    - Persistent in time
    - Not better explained by context or other medical or mental condition
    - Causes substantial dysfunction in more than one setting

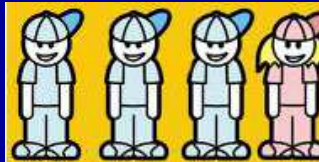
## Epidemiology

- 4-10% of population diagnosed with ADHD
  - In a classroom of 24 to 30 children, it is likely that at least one will have ADHD.



## Epidemiology

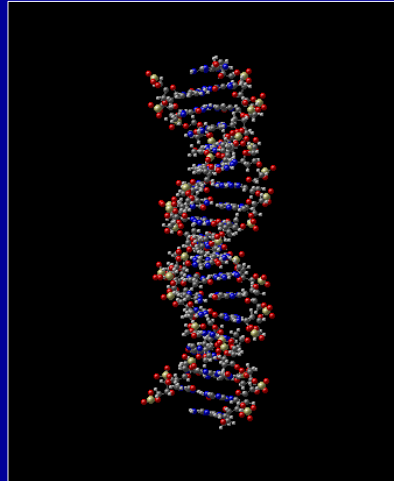
- Male predominance of diagnosis
  - Females under-diagnosed



- 7% of American children receive stimulant medication (9/10 with methylphenidate)
  - 25% of special education population

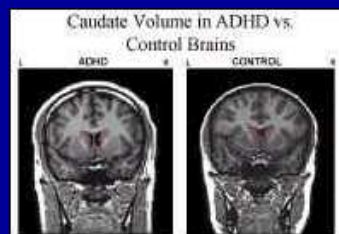
## Genetics

- About 15 - 40% of parents of ADHD children are affected with ADHD
- About 20-25% of siblings of ADHD children are affected with ADHD
- About 70-80% of identical twins of ADHD children are affected with ADHD
- Fivefold increase in risk to first degree relatives of ADHD subjects vs. normal population



## Neurobiology

- Variations in brain structure and function
  - Basal ganglia (esp. caudate, globus pallidus)
    - loss of normal R>L asymmetry
  - Cerebellum
    - smaller volumes
  - Corpus callosum
    - smaller volumes
  - Frontal Lobe
    - smaller volume; reduced activity



## Executive Functioning Deficits

- Inhibition
  - putting the brakes on behavior
- Self-Regulation
  - ability to tolerate frustration, thinking before acting or speaking
- Attention Shifting
  - Ignoring distractors, paying attention to what's important
- Memory
  - holding facts in mind while manipulating information; accessing facts stored in long-term memory
- Planning
  - think ahead, organize work
- Activation, arousal, effort
  - getting started, paying attention, finishing work

## Medication

- Approximately 70% of children positively respond to stimulant medication.
  - Extremely effective (effect size >1.0)
    - But does not “cure” the disorder
    - Does not treat associated symptoms
    - Some children experience side effects
    - Much less effective in preschoolers
    - Growth retardation is an issue



# CAARTE

Center for Advanced ADHD, Research, Treatment,  
and Education

A collaboration between UT Southwestern  
Medical Center, Shelton School, and UT Dallas  
Center for Brain Health

## CAARTE Vision/Mission




### **Vision:**

- To become a leading center in Dallas specializing in developing, researching, and providing interventions for Attention-Deficit/Hyperactivity Disorder (ADHD) to optimize social, cognitive, and brain development.

### **Mission:**

- Identify preschool children at early phases of ADHD-like symptoms and provide evidence-based parent training with a focus on *prevention*
- Develop and research innovative treatments, including attention, strategic memory, and reasoning training for children diagnosed with ADHD
- Identify who can benefit from treatment and whether treatment works using state-of-the-art brain imaging technology
- Investigate neurological bases for ADHD including brain function and genetics

## Non-Pharmacological Treatments

- Behavioral parent training 
- Behavioral classroom interventions 
- *Social skills training* 
- *Attention training*
  - Working memory training (RoboMemo)
- *Biofeedback*

## Preschool Intervention & Parent Education Study

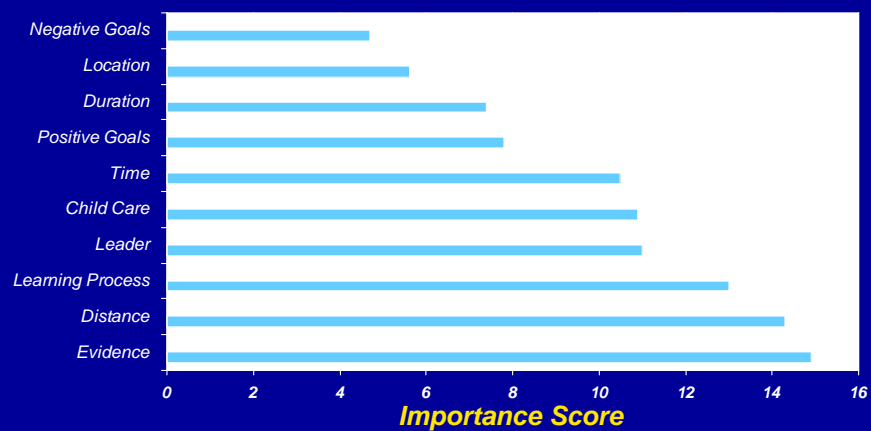


- For parents and preschoolers (ages 3-7) at risk for ADHD
- Sequenced treatments
  - 10-week community parent education (COPE) parenting intervention
  - 8-week attention, inhibition, and memory (AIM) parent and child intervention

## Rationale for parent education

- Poor parent-child relationship is highly correlated with risk for continued behavior problems
- Positive parenting and positive parent-child relationships mitigate risk for persistent externalizing behaviors.
- School readiness is enhanced by prevention efforts aimed at improving parenting skills and parent-child relationships at an early age

### **Consumer Preference Modeling: Factors Influencing the Decision to Enroll in Parent Training Programs**



Source: Cunningham, et al. 2003

## Evidence-based strategies with typical effect size 1.0 or greater in clinical practice

- Attending Strategies (Describing, Labeling, Repeating)
- Rewards
- Planned Ignoring
- More Effective Commands
- Transitional Strategies (When-Then)
- Planning Problem Solving
- Point Systems and Behavioral Contracting
- Time Out

## Evidence Based Learning Strategies

- Modeling
- Practice
- Active discussion
- Attributional questions

## COPE

- 10-week COPE parenting intervention
  - 10+ families per COPE group
  - Large group process
  - Positive and negative models for parenting
  - Active learning
  - Socratic questions

## COPE

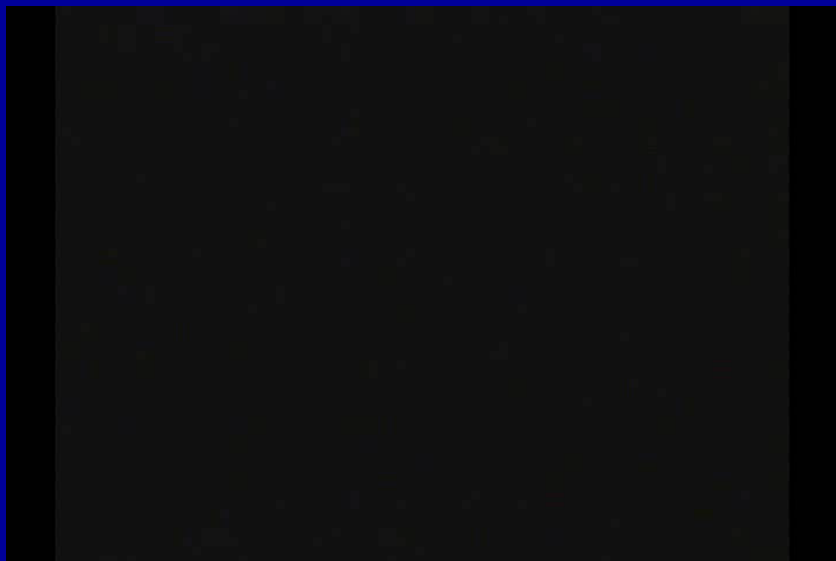
### Weekly parenting groups

- Attending, Rewards, Balanced Attending
- Transitional Statements/When-Then
- Planned Ignoring
- Planning Ahead
- Point Systems
- Time Out
- Problem Solving (PASTE)

## COPE

- Homework review
- Videotaped vignette review
  - errors, consequences, alternatives
- Leader modeling
- Homework planning
- Role Plays

## COPE Vignette



## COPE Goals

- Increase Child Management Skills
- Increase Problem Solving Skills
- Increase Supportive Communication
- Increase Shared Responsibility
- Develop Personal Networks
- Develop Knowledge of Local Resources

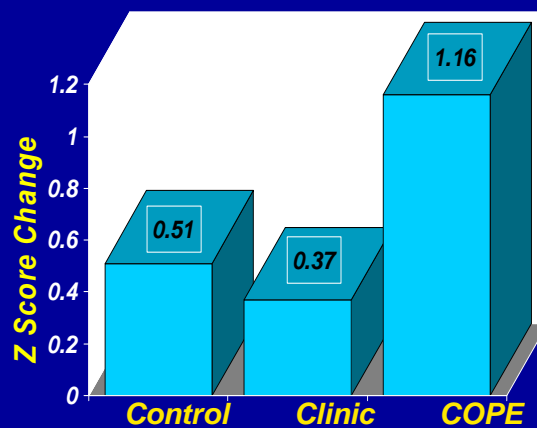
## Large groups - Process advantages

- Normalizing
- Shared Concerns
- Altruistic Opportunities
- Supportive Networks
- Knowledge of Local Resources

## COPE Model - Process Advantages

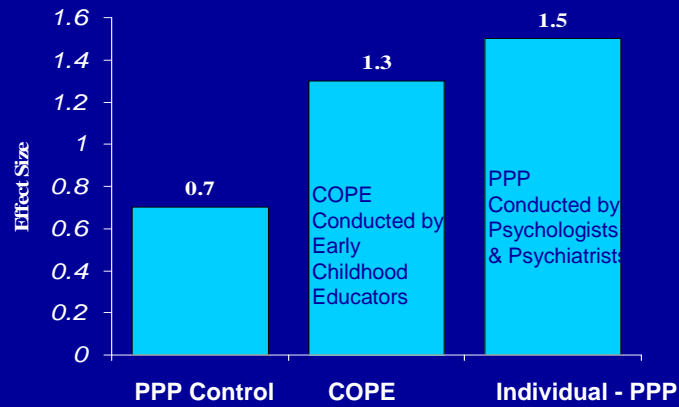
- Reduction in Resistance
- Wider Range of Solutions
- Attitude Change
- Enhanced Commitment
- Improved Self Efficacy

## COPE Workshop Outcome: Reduction in Problems at Home



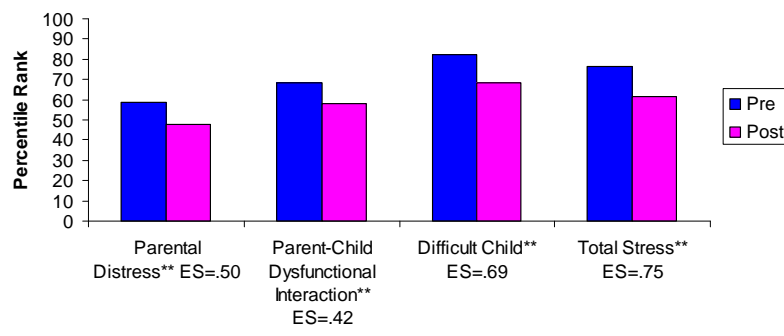
Source: Cunningham, et al., 1995

## Benchmarking Parent Reported Externalizing Problem Effect Sizes



Source: COPE 2003-2004

## Parenting Stress Index - Short Form (n=33)



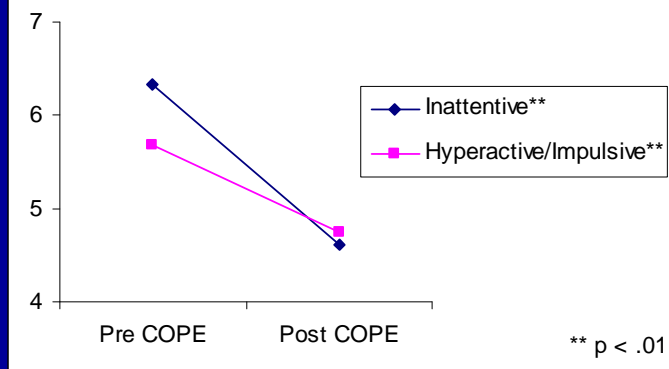
T-tests conducted on subscale scores – all showed significant decrease from pre to post ( $p < .001$ ) and medium to large effect sizes

## Does COPE improve reports of child behavior? Parent Ratings of Obedience

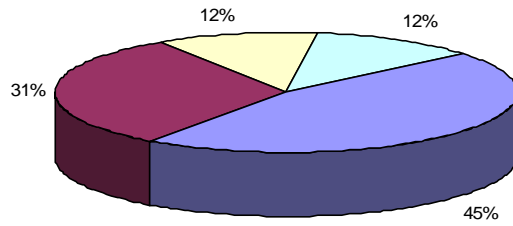


\*\* = significant increase with paired samples t-test [ $t(288) = -12.78, p < .000$ ]  
Effect size = .8

## ADHD Symptom Counts



## Parent Self-Report – Why attend COPE?



- To learn more about parenting
- I was concerned that my child had a behavior problem.
- Counselor/professional recommendation
- Teacher recommendation

### Most Helpful Strategies n=49



## Treatment Sequencing

- Why COPE first?
  - Help identify whom can benefit from additional treatment (screen out false positives)
  - Help parents get behavior problems under control early
- Why additional treatment
  - Parent training emphasis is behavior management, not necessarily executive functioning which is also essential for school readiness

## Attention Training

- Based on the concept that attention is an organ system or muscle that serves a general central function.
- Theoretically this organ system can be trained.
- Assumes that processes of neural plasticity allow for improved efficiency of this general process with focused and extended practice
- First applications in animals and in humans support this approach.

## Attention, Inhibition, Memory (AIM) Intervention

- Attention Training intervention
  - Developed at U. of Oregon
- Activities designed to increase attention, inhibition, and memory
  - 8 weekly sessions + homework
    - Parents – learning to be AIM interventionists
      - » 3 activities/week as homework
      - » Phone calls with parents 1x/week for compliance
    - Child – participating in AIM activities (small groups)

## AIM

- Whole body control
- Fine motor control
- Breath control
- Mind control (visualization/memory)
- Specific praise
- Common framework of what it means to “pay attention”
- Flexibility

# AIM

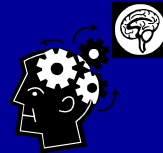
## Pay Attention Poster



Eyes Looking  
Ears Listening

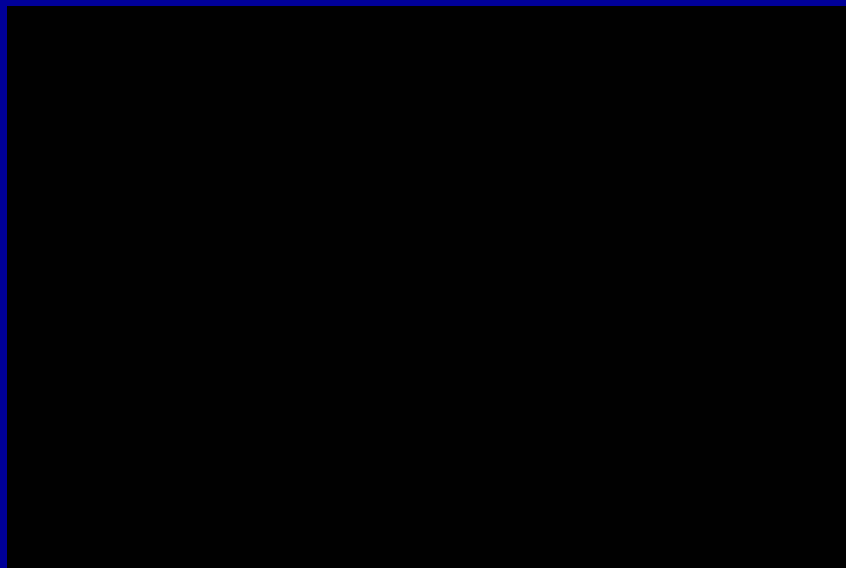


Body Still



Brain Thinking

## AIM Vignette

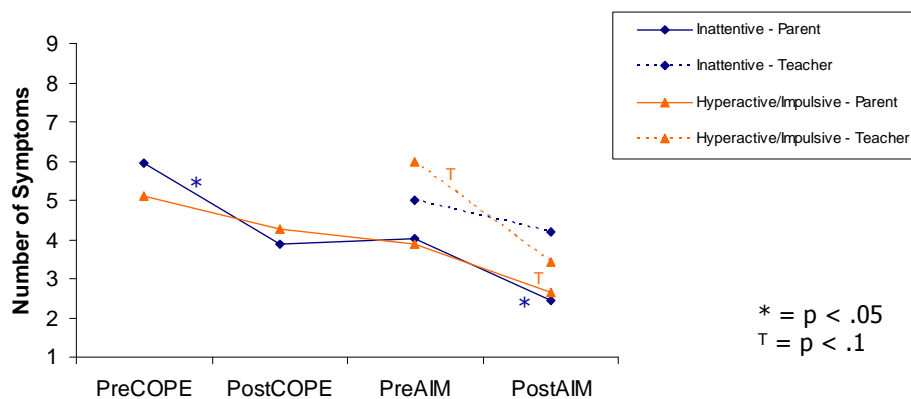


# Feasibility Trial Data

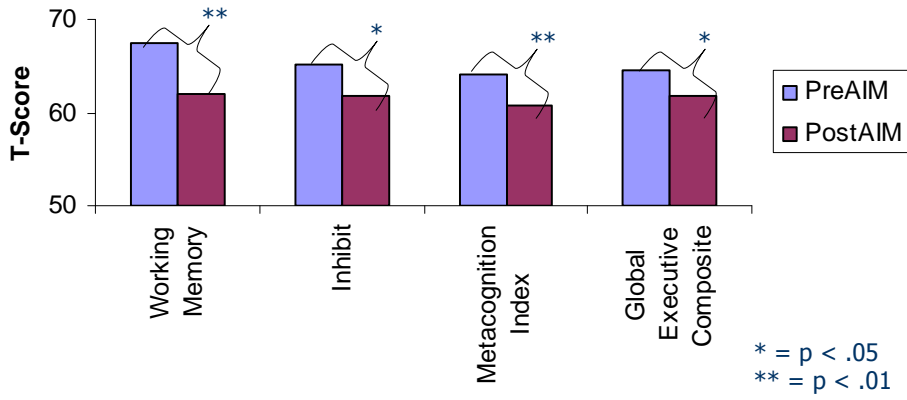
- N=28; 71% Male
- Average age: 5.6 (1.3)
- 89% Caucasian
- ADHD Diagnosis
  - 14 ADHD Combined Type
  - 9 ADHD Inattentive Type
  - 2 ADHD NOS
- Full Scale IQ: 101 (26)



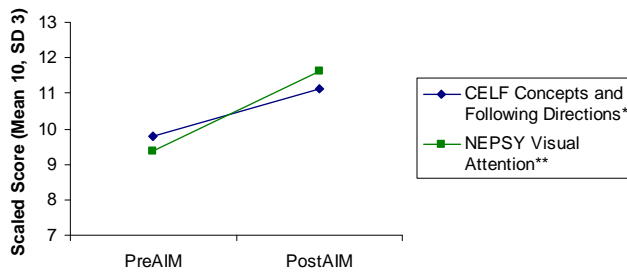
### ADHD Checklist - Symptom Ratings



### Behavior Rating Inventory of Executive Function

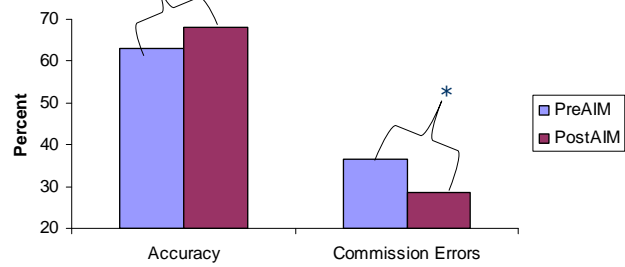


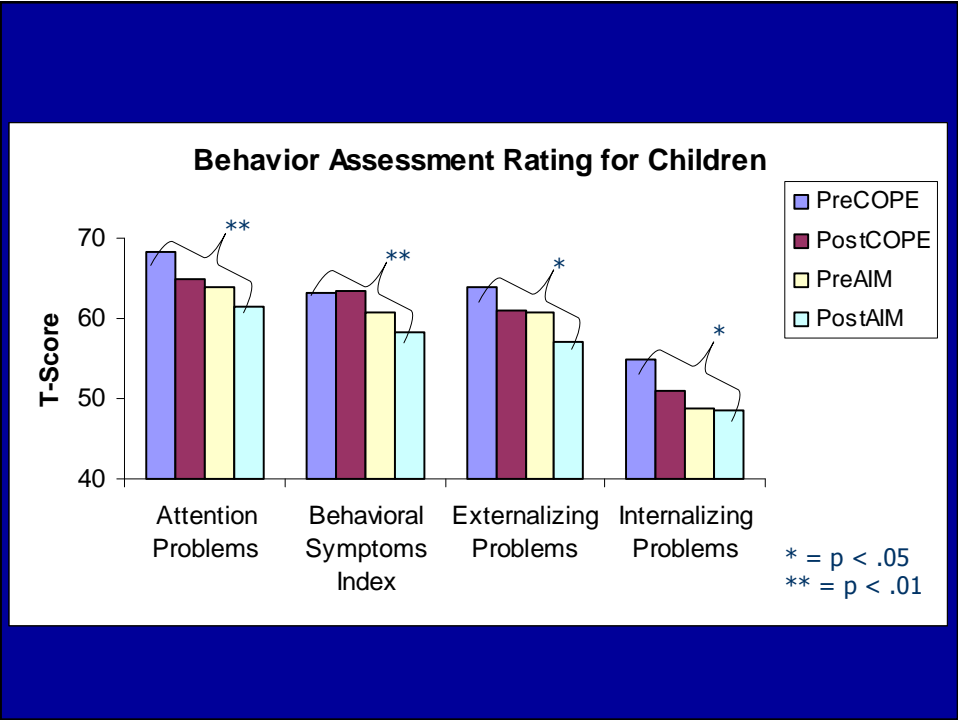
### Child Neuropsychological Measures



\* =  $p < .05$   
\*\* =  $p < .01$

### MMAT





## School-aged Intervention & Learning Study (SAILS)



- For children (ages 8-12) diagnosed with ADHD
- 8 week, 16-session attention training program – Pay Attention!
  - 30-minute training sessions 2x/week
  - 10-15 minute check in with parents to promote reinforcement and generalization of skills
  - Supplemental materials for parents

## Pay Attention!

- Downward extension of Attention Process Training
  - Developed for adults with attentional/cognitive deficits secondary to TBI
  - Modified for children ages 7 to 11
- Hierarchical model of attention
- Increasingly complex tasks
- Distracters added to tasks to increase complexity and improve level attention skills



## Pay Attention!

- Sustained - **Maintain attention during continuous activity**
  - Visual: Card Sort; House Search; Flash Cards
  - Auditory: Go/No Go (colors, numbers)
- Selective - **Maintain attention during distracting/competing stim**
  - Visual: House Search w/ Distractor Overlay
  - Visual: House Search w/ Distractor Overlay & Audio Distractor (heart beat, crying, story, playing)
  - Auditory selective attention: Go/No Go with auditory distractors
- Alternating - **Mental flexibility to shift between tasks**
  - Visual: House search w/ switch; Card sort with switch
  - Color Go/No Go with switch
- Divided - **Respond simultaneously to multiple tasks**
  - Visual: Card sort with 2 tasks
  - Auditory/Visual: House search AND Go/No Go at same time

## Pay Attention!

- Original RCT for Pay Attention
  - 14 children dx with ADHD, ages 7-11
  - ½ = Pay Attention; ½ = Computer activities
  - 8 weeks; bi-weekly 30 minute sessions
  - Treatment group
    - significant improvements on non-trained measures of attention and academic efficiency
    - slight improvement on teacher ratings of impulsivity/inattention
    - no differences on parent ratings of ADHD sx

Kerns, Eso, & Thomson (1999)

## Pay Attention! Vignette

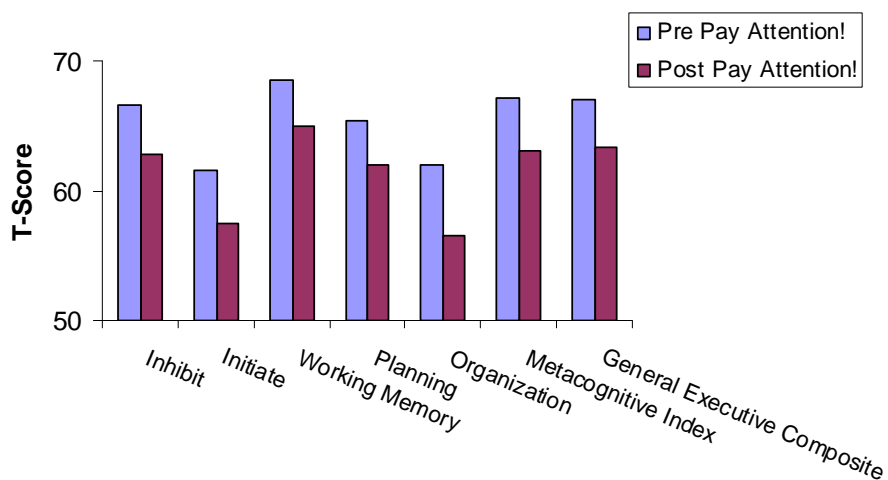


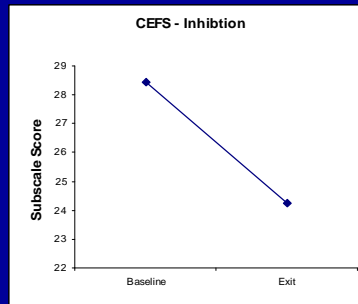
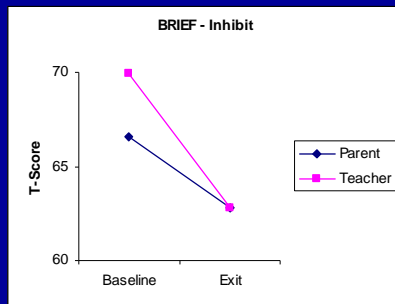
## Feasibility Trial Data

- n=23
- Ages 8 to 14
- 71% Male
- 30% unmedicated
- ADHD Diagnosis
  - 11 ADHD Combined Type
  - 11 ADHD Inattentive Type
  - 1 ADHD NOS
- Full Scale IQ: 109 (13)



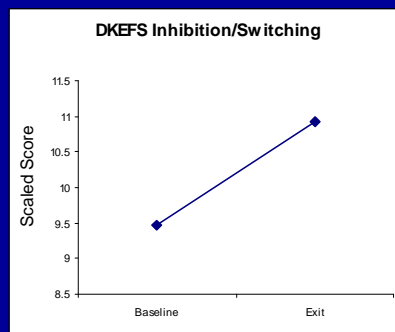
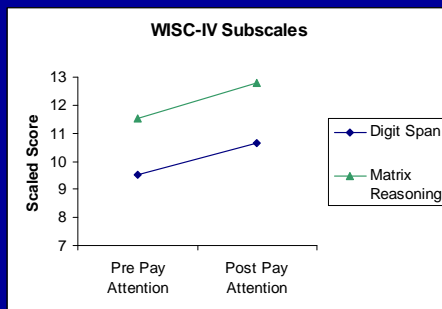
### Behavior Rating Inventory of Executive Function





**Acts wild/silly  
Interrupts  
Gets out of seat  
Out of control  
Blurts things out  
Trouble putting on the brakes**

**Touches everything  
Interrupts  
Can't wait turn  
Shifts from thing to thing  
Won't follow directions  
Excitable & Impulsive**



**QUESTIONS?**

