Current Views of the Best Treatments for ADHD: A Decade-plus of Research on Comparing, Combining, & Sequencing Interventions for Childhood ADHD

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Disclosures
Past Consultant, scientific advisor, speaker, grant recipient:
McNeil/Akza (Concerta)
Abbott
Shire (Adderall, Adderall XR, guanfacine)
Noven (Daytrana)
Lilly (Strattera)
MTA principal investigator

ADHD: Importance to Professionals
Prevalence: 9-12% of population in the U.S.—higher in boys—similar prevalence across many countries

Children dealt with by:
- Health Care Professionals
- Mental Health Professionals
- Allied Health Professionals
- Educators

Most common behavioral referral to health care professionals
Most common referral/diagnosis in special education
Most common behavior problem in regular education classrooms
Most common diagnosis in child mental health facilities

(American Psychiatric Association, 2013; Barkley, 2006; Centers for Disease Control and Prevention, 2010; Pelham, 2013; Pelham, Fabiano, & Massetti, 2005)

“Many of the ‘experts’ at Jerome Horwitz Elementary School had their opinions about George and Harold. Their guidance counselor, Mr. Rected, thought the boys suffered from A.D.D. The school psychologist, Miss Labler, diagnosed them with A.D.H.D. And their mean old principal, Mr. Krupp, thought they were just plain old B.A.D.!”

A Variety of Names—Same Disorder—Same Children
- Brain Damage (BD)
- Minimal Brain Damage (MBD)
- Minimal Brain Dysfunction (MBD)
- Hyperkinetic-Impulsive Disorder
- Hyperkinetic Reaction of Childhood/Hyperkinesis/Hyperactivity—DSM II
- Attention Deficit Disorder (with and without hyperactivity)—DSM III
- Attention Deficit-Hyperactivity Disorder—DSM III-R, DSM IV, DSM V

(Barkley, 2006)
ADHD: Core Symptoms--Same Over Past 50 Years

Inattention
Impulsivity
Hyperactivity

DSM-5 Definition of ADHD

A. Six Symptoms of either Inatt. or Hyp/Impuls.

1. Inattention:
   - often fails to give close attention to details or makes careless mistakes in schoolwork, work, or other activities
   - often has difficulty sustaining attention in tasks or play activities
   - often does not seem to listen when being spoken to directly
   - often does not follow through on instructions and fails to finish schoolwork, chores, or duties in the workplace
   - often has difficulties organizing tasks and activities
   - often avoids or has difficulties engaging in tasks that require sustained mental effort
   - often loses things necessary for tasks or activities
   - often is easily distracted by extraneous stimuli
   - often forgetful in daily activities

B. Some symptoms that caused impairment were present before age 12.

C. Some symptoms that cause impairment are present in two or more settings (e.g. at school, work, and at home).

D. There must be clear evidence of clinically significant impairment in social, academic, or occupational functioning.

E. Does not occur exclusively during the course of Pervasive Developmental Disorder, Schizophrenia or other Psychotic Disorder, and is not better accounted for by a Mood Disorder, Anxiety Disorder, Dissociative Disorder, or a Personality Disorder.

Comorbidity with ADHD

- Learning disorders
- Language and communication disorders
- Conduct disorder
- Oppositional defiant disorder
- Anxiety disorder
- Mood disorders
- Tourette's syndrome; chronic tics

BUT...Are DSM Symptoms/Diagnoses important for:
Etiology, Mechanisms of Dysfunction, Treatment Conceptualization and Implementation, and Prediction of outcome in ADHD?

Domains of Functional Impairment in ADHD Children

- Relationships with parents, teachers, and other adults
- Relationships with peers and siblings
- Academic achievement
- Behavioral functioning at school
- Family functioning at home
- Leisure activities

(Barkley, 2006; Fabiano & Pelham, in press)

Central Role of Functional Impairment in Treatment

- Impairment—that is, problems in daily life functioning that result from symptoms and deficits in adaptive skills—is
  - (1) why children are referred,
  - (2) what mediates long-term outcome, and therefore
  - (3) what should be targeted in treatment.

- Key domains are peer relationships, parenting/family, and academic achievement

- Assessment of impairment in daily life functioning and adaptive skills is the most fundamental aspect of
  - initial evaluation to determine targets of treatment
  - Ongoing assessment to evaluate treatment response.

- Normalization or minimization of impairment in daily life functioning and maximization of adaptive skills is the goal of treatment—restabilization of symptoms.

(Pelham, Fabiano, & Massetti, 2005; Pelham & Fabiano, 2008)

Why Is it Important to Treat ADHD in Childhood?
Prognosis for ADHD Children
Chronic disorder (AAP, 2001, 2011, 2019) extending into adolescence and adulthood

One-third: **Tolerable outcome;** appear to have mild problems but must constantly work to adapt to their difficulties.

One-third: **Moderate poor outcome;** continue to have a variety of moderate to serious problems, including school difficulties (adolescents) or vocational and financial adjustment difficulties (adults); interpersonal problems, problems with substance use and abuse, psychological problems, etc.

One-third: **Bad outcome;** severe dysfunction and/or psychopathology, including sociopathy, repeated criminal activity and resulting incarceration, alcoholism, drug use disorders.

(Barkley, 1998; Barkley et al., 2016; Lee et al., 2017; Pelham & Fabiano, 2000; Molina & Pelham, 2014)

What is Effective, Evidence-based Treatment for ADHD in Childhood?

Common but Not Evidence-Based Treatments
(1) Traditional one-to-one therapy or counseling
(2) Cognitive therapy
(3) Office-based “Play Therapy”
(4) Elimination diets
(5) Biofeedback/neural therapy/attention (EEG) training
(6) Allergy treatments
(7) Chiropractics
(8) Perceptual or motor training/sensory integration training
(9) Most other OT interventions (e.g., adaptive furniture)
(10) Pet therapy
(11) Dietary supplements (megavitamins, blue-green algae)
(12) Duct tape

Evidence-Based Short-term Treatments for ADHD
(1) Behavior modification
-hundreds of studies
(2) CNS stimulant medication
-hundreds of studies
(3) The combination of (1) and (2).
>30+ studies

Evidence-based Short-term Treatments for ADHD
Moderate to large effect sizes across treatments


Psychoactive Medication Business is Booming in America
- Pediatric drugs are typically more expensive than in adults because of lack of generics—dramatic increases in expenditures in past decade
- Insurance plans now spend more money on psychotropic than antibiotics or asthma meds (17% total drug costs) with stimulants for ADHD being the leading cost
- 6% of children in the U.S. took at least one psychotropic in 2005, with 1/3 of those taking 2+meds
- Steady increases in use of antipsychotic medications (10% increases in 2008)—18% of ADHD children in Medicaid
- Stimulants are the most prescribed child psychotropic—4%-7% of U.S. child population are medicated daily with stimulants for ADHD—many more than receive BMDD
- Two likely causes for the increase


Guidelines on Treatments and Sequencing

- Task Force of APA (2007) says psychosocial first
- Division 53 reviews of the APA have said since 1998 that there is solid evidence supporting BT
- Japanese pediatric guidelines (2008) say behavioral/educational first
- British guidelines (NICE, 2009) say behavioral first in mild to moderate cases
- CHADD says simultaneous
- AHRQ has said in 30 years of reviews that there is no evidence supporting behavioral treatment
- Guidelines of the AACAP (2007) say medication first (and 2nd, 3rd, 4th, and 5th) because behavioral treatments (BT) are not effective
- AAP 2011 is in the middle
- CDC says BT for young kids—Russ Barkley says medication!

AAP Clinical Practice Guideline: Treatment of the School-Aged Child with Attention-Deficit/Hyperactivity Disorder (Pediatrics, 2019)

- For elementary-aged children and adolescents, the primary care clinician should prescribe FDA-approved medication and behavior therapy—both home and school interventions—to improve target outcomes in children with ADHD.

SDBP Clinical Practice Guideline: Treatment of Complex ADHD in children and Teens (JDBP, 2020)

- For all children and adolescents with complex ADHD, the developmental and behavioral pediatrician should prescribe BPT and BCM interventions for home and school to improve impairment in children with ADHD, with adjunctive psychostimulant medication for children for whom impairment is not sufficiently resolved with behavioral treatments alone.

Components of Effective, Comprehensive Treatment for ADHD

- Behavioral Intervention
  - Behavioral Parent Training
  - Behavioral School Intervention
- Medication as adjunct

J Devel and Behav Pediatrics (Feb. 2000)

Despite the Evidence, Medication is Universally Used as First-line Treatment for ADHD in the U.S.

A Risk Benefit Analysis shows clearly that Behavior Therapy (BT) has Lower Risks (Side Effects) and Equivalent Efficacy So BT should Routinely be the First Line Treatment for ADHD

(Pelham & Fabiano, 2006; Fabiano et al. 2009)
Who is it important to include Parent Training, School Interventions, and Peer-focused Interventions in ADHD Treatment?

• No one is taught how to be a parent and parents of ADHD children have significant stress, psychopathology, and poor parenting skills

• ADHD children have severe academic and behavioral problems in school throughout the grades and teachers are not trained to educate them

• ADHD children often have severely disturbed peer relationships that cannot be sufficiently modified by parents or teachers on their own

(Pelham, 2009)

Benefits of Short-term Effects of Behavioral Treatments (Pelham et al, 2001)

• Improved functioning in home (e.g., improved compliance and parent ratings), school (e.g., improvement in classroom disruptive behavior and teacher ratings), and peer settings (e.g., improved positive and negative interactions)

• Evidence for benefit throughout the age range (4 to 15) but fewer studies at younger and older ages

• Moderate to large effect sizes across treatments and measures

• Benefits independent of comorbidity

• However, room for improvement even after acute clinic-level treatment for many children

• Less evidence (few studies) for long-term benefits

• Are we maintaining benefits from acute treatments and thus emphasis on chronic care model—this is sustained low-dose maintenance intervention after acute treatment

(Milich & Landau, 1982)

Limitations of Pharmacological Interventions When Used Alone

1) Rarely sufficient to bring a child to the normal range of functioning

2) Works only when medication is ingested for 4-12 hours

3) Not effective for all children

4) Does not affect several important variables (e.g., academic achievement, concurrent family problems, peer relationships)

5) Poor Compliance in long-term use

6) Parents are not satisfied with medication alone

7) Removes incentive for parents and teachers/schools to work on other interventions

8) Uniform lack of evidence for beneficial long-term effects (MTA, 2009)

9) Reduction in growth and ultimate adult height (MTA, Swanson et al, 2002; Johnston & Mash, 2001; Volkow, 2008)

10) Life effects (MTA, 2001)

11) Lack of information about long-term safety (e.g., later substance use)

(Pelham et al, 2001)

Main Beneficial Short-term Effects of Pharmacological Treatments

1. Decrease in classroom disruption

2. Improvement in teacher and parent ratings of behavior

3. Improvement in rule following and compliance with adult requests and commands

4. Increase in on-task behavior and daily academic productivity and accuracy (but not achievement)

5. Improvement in peer interactions

6. Improvement on a variety of laboratory tasks of cognition

(Sweezem, 2003)

Classroom Rule Violations (Pelham et al, 2001)

Survival distribution of attention-deficit/hyperactivity disorder (ADHD) treatments for extended-release (ER-MPH) and immediate-release (IR-MPH) methylphenidate hydrochloride (MPH) and atomoxetine.

Trends in Medication Dose: A BOE Analysis

• Before MTA, Concerta, and Adderall XR
  - Modd for school hours only (180 days per year)
  - Modd total daily dose: 15-25 mg MPH; 10 mg Adderall
  - Weekends and summer medication free
  - Max children medicated 1-3 years
  - Lifetime dose: 5400 mg to 10,800 mg MPH

• After MTA, Concerta, and Adderall XR
  - Modd for school and home
  - Equivalent total daily dose: 30 mg Concerta; 20 mg Adderall XR
  - Weekends and summer medicated (no 365 days per year)
  - Current recommendation (e.g., MTA) start weekly and medicate for all 12 school years
  - Lifetime dose: 14,600 mg/yr X 12 = 175,000 mg MPH

• Is this increase safe in the long run?

Summary: Components of Effective, Evidence-based, Psychosocial Treatment for ADHD

• Parent Training—Use always

• School Intervention—Use always

• Child Intervention—Use when indicated because of complexity/expense

• Medication—Use in low doses as short-term adjunct only when behavioral treatments are insufficient
What Do We Know About Comparative and Combined Treatment Studies?

Questions the NIMH 1999 MTA Study Did Not Answer

What treatments does a given child need?
Should behavioral treatment begin before medication (parent preference) or vice versa (physician practice) or should they be implemented simultaneously (as in the MTA).

What are the best "doses" of psychosocial, pharmacological, and combined treatments?
If one or the other modality is begun first, how long should it be conducted and at what dose before adding in the second modality?

What are the implications of different doses and sequences for treatment dosing, benefit, and risk of side effects?
These are the questions that families, practitioners, and educators face daily. We have studied them for the past 18 years.

Our Research Program in the Past 20 Years

Five studies funded by NIMH and IES that examine dose effects and sequencing effects of behavioral and pharmacological to:
(1) Controlled examination of 3 levels of behavior modification (none, low intensity, high intensity) crossed with 4 doses of medication in a summer program setting and at home
(2) Follow up to (1): School-year evaluation of effectiveness and need for medication after beginning the year on one of 3 behavior modification levels (none, low intensity, high intensity)
(3) SMART (sequential, multiple, adaptive, randomized trial) design to examine whether to begin treatment with medication or behavioral therapy and, when nonresponse, whether to add the other modality or increase the intensity of either modality
(4) Evaluation of Brief effectiveness and need for medication in young ADHD children beginning treatment (home, school, peers, academic) with one of the same behavior modification levels as above (with additional components) and continuing without fading for 3 years to pass peak period for medication use
(5) Two phase, linked evaluation of tolerance to stimulant medication in the STP and school-year settings, with multiple embedded studies of combined and comparative treatments.

Dose-Response Effects of Behavior Modification, Medication, and their Combination in ADHD Children in a Summer Setting


Summer Treatment Program Overview
- Children grouped by age into groups of 12-16
- Groups stay together throughout the day
- 4-5 paraprofessional counselors work with each group all day outside of the classroom
- One teacher and an aide staff the classroom for each group
- Treatment implemented in context of recreational and academic activities
- Focus on Impairment and teaching skills-not symptoms
- Parent training incorporated
- Medication is second line treatment

Design
48-52 ADHD children per summer for 3 summers
4 Medication conditions: placebo and 3 doses of methylphenidate (.15mg/kg, .3 mg/kg, .6 mg/kg, t.i.d.), with order varying daily within child for 9 weeks
3 Behavioral Modification conditions: No behavioral treatment (NBM), low-intensity (LBM) treatment, and high-intensity (HBM) treatment
3 Medication conditions: Placebo, .15 mg/kg MPH, .3 mg/kg MPH, .6 mg/kg MPH
3, 3-week Behavior Modification conditions assigned randomly:
- NonADHD comparison group (24/summer).

Comparative and Combined Treatments for ADHD

3, 3-week Behavior Modification conditions assigned randomly:
- Daily Crossover of 4 Med conditions:
  - High Intensity BMod
  - Low Intensity BMod
  - No BMod

4 Medication conditions:
- Placebo
- Low Dose (0.15mg/kg MPH)
- Medium Dose (0.3mg/kg MPH)
- High Dose (0.6mg/kg MPH)
Dependent Measures

- Counselor-Recorded Daily Behavior
  - Following Activity Rules
  - Noncompliance
  - Interjecting
  - Complaining
  - Grading problems
  - Negative verbalizations
- Classroom Behavior
  - Seatwork productivity and accuracy
  - Staff and parent behavior ratings
  - Staff and parent ratings of treatment effectiveness and distress

Results Summary

Both medication and behavioral treatment produced significant and generally comparable effects on nearly all measures of functioning in recreational and classroom settings.

Relatively low doses of both modalities produced benefits with no SE at the lowest medication dose and considerable SE at the highest dose.

On most measures in both classroom and recreational settings, the combination of the lowest dose of medication (or a very low dose—15 mg/kg per day) and LBM produced as much or sometimes more change than did the four-times-higher doses of medication in the NBM condition and HBM without medication.

Parents preferred the behavioral treatments or their combination with low-dose medication.

Thus, combined treatment allows low doses of medication and lower doses of behavior modification with excellent outcomes.

Limitation

The study was conducted in an analogue summer program setting, and the treatments were implemented simultaneously. What would have happened in natural settings (e.g., school) and if BM or Medication were implemented first?

Sample Characteristics

- 146 Children with DSM IV ADHD (74 and 72 in M First and B first) based on T ratings and P ratings and structured interview
- 80% Combined type diagnosis
- Mean age: 8.4 years
- IQ: 99
- Comorbid ODD/CD: 72%
- Prior Child Medication Treatment: 29%
- Race: 80% Caucasian
- Parent Marital Status: 9% single mothers
- Parent Education: 26% HS or Technical School; 50% AA or BA

Recruited in Spring of 3 Consecutive years

- Children recruited from schools pediatricians, newspaper, radio, mental health clinics, and parent referrals
- Baseline assessment in June
- Treatment began in late August/beginning of school
- Treatment implemented for the school year
- Endpoint measures taken at end of school year

Adaptive Pharmacological and Behavioral Treatments for Children with ADHD: Sequencing, Combining, and Escalating Doses

William E. Pelham, Jr., Gregory Fabiano, Lisa Burrows-MacLean, James Wadsworth, Susan Murphy, E. Michael Fossler, Elizabeth Gragey, Andrew Grainer, Timothy Page, William E.Pelham, III, Jihnhee Yu, Stefany Coss

(Pelham et al, JCCAP, 2016; Page et al, JCCAP, 2016)
Specific Aims/Questions
1) Is it better to begin treatment for ADHD children with a low dose of Behavior Modification or a low dose of Medication?

2) What is the most effective treatment protocol among the four embedded treatment protocols (BB, BM, MB, MM)—that is, best pattern of initial treatment and conditional second stage treatment?
   - 3) In the event of insufficient response to each initial treatment is it more effective to increase the dose of that treatment or add the other modality?
   - 4) What are the relative costs of these treatment strategies?

Indicators of Need for Additional Treatment at 8-week and Subsequent Assessments:
1) Average performance on the ITB is less than 75% AND
2) Rating by parents or teachers as impaired (i.e., greater than 3) on the IRS in at least one domain.

Treatment decisions and content are evaluated monthly (or more frequently) and tailored to the specific domains of impairment rated on the IRS.

Treatment Components

Medication
- 8-hour stimulant equivalent to 0.15 mg/kg methylphenidate b.i.d.
- Increased school dose
- Added evening/weekend doses

Behavioral Treatment
- 8 weekly sessions of group behavioral parent training (concurrent group social skills training for children)
- Monthly booster parent training sessions
- 3 consultation meetings with primary teacher to establish a school-home daily report card
- One individual parent training session to establish home rewards for daily report card
- Time-out in school
- Tutoring
- Weekly Saturday social skills sessions
- Homework skills training
- Paraprofessional implemented school rewards programs
- Home-based daily report card

First Aim/Question
- Is it better to begin treatment for ADHD children with a low dose of Behavior Modification or a low dose of Medication?
  - It is better to begin with Behavior Modification

Outcomes on Objective Measures by Treatment Group

- Additional Bmod was more effective on rule violations than adding Med for BehFirst; additional Med was slightly better than adding Bmod for MedFirst.
- Rule violation rates were nearly twice as high for the two medication conditions as for the two behavioral conditions.

Second Aim/Question
- What is the most effective treatment protocol among the four embedded treatment protocols (BB, BM, MB, MM)—that is, best pattern of initial treatment and conditional second stage treatment?
  - The best protocol was BM; the worse was MB. BB was close to BM (and better on classroom obs.) and MM was only slightly better than MB.

Third Aim/Question
- In the event of insufficient response to each initial treatment is it more effective to increase the dose of that treatment or add the other modality?
  - Additional Bmod was more effective on rule violations than adding Med for BehFirst; additional Med was slightly better than adding Bmod for MedFirst.
Conclusions from Effectiveness Analyses

Sequence of Treatment Impacts Outcomes

- Differences in treatment-outcome of children treated in home settings is based on single factor analysis of variance
- Differences in treatment-outcome of children treated in schools are based on analysis of variance

Results are generally mediated by parent training attendance/participation

- Effects of parent training skills of home and general on attendance with the children’s schools, e.g., attendance at (DRC) and monitoring with teachers, were limited dependently where medication was first, medication appears to undermine parent attendance in treatment

- A session of group PT and a teacher implemented DRC is sufficient for 36% of ADHD children, 65% need either more group or individual sessions (see average only in a benefit of 100% of children on combined treatment with medication as 1:1 ratio, but no indication on additional time needed for each individual session)

- 54% of children responded well to a very low dose of medication, but increases in medication dose in some children resulted in better outcomes in school and the home. Therefore, physicians who start treatment with medication will produce poor outcomes in half of their patients.

- Prior experience with medication moderated these effects

Analyzing Cost of Treatments

- Goal: determine cost of treatment for each child over the 10-month (school-year) duration of study
- Detailed logs contained information on every instance of treatment each child received, including type, date, location, persons present, and duration
- For each child we compute the amount of:
  - physician time (valued at $86/hour)
  - clinician time ($21 or $36/hour)
  - paraprofessional time ($12/hour)
  - teacher time ($41/hour)
  - parent time ($23/hour)
  - medication ($0.30 – $2 for IR, $4 – $8 for ER)
  - gasoline ($3.14/gallon)
- Wages taken from the U.S. Bureau of Labor Statistics
- Average treatment cost is then simply the sum of enumerated cost categories divided by the number of children

Costs Based on Initial Assignment

- Direct Cost
- Including Parent Cost and Gas
- Behavior First
- Medication First

Costs of Combined and Unimodal Treatments and Sequences

- Only previous comparison of treatment costs is MTA (Jensen et al., 2005)
- Limitations of MTA cost study:
  - Expensive, intensive behavioral treatment used
  - All children received fixed treatment regardless of need
  - At the time of the MTA, inexpensive, generic immediate-release methylphenidate was standard
  - Now, children are medicated with new, extended-release formulations that are much more costly—$7.50 daily vs. 30 cents
Cost of Combined Treatments

Cost Summary
- Behavioral First was significantly less expensive than Medication First
- Behavioral plus Behavioral if necessary was less expensive than Medication plus medication if necessary
- Behavioral plus medication if necessary was less expensive than Medication plus behavioral if necessary
- The incremental costs of behavioral treatment were offset by reductions in medication cost when behavioral treatment was implemented first.
- $4 billion could be saved in US healthcare economy if medication were NOT the first-line treatment for childhood ADHD.

Next Steps in Research: Replicate and Expand this Approach

Unique and Multimodal Treatment Effects on Homework in Children with ADHD
Merrill et al (2016)
Journal of Consulting and Clinical Psychology, 82(2), 11-122

Academic and Homework Impairment in ADHD
- Children with ADHD
  - Lower seatwork completion
  - Lower on-task behavior
  - Impaired homework performance
- 68% of individuals with childhood ADHD graduate high school, compared to virtually all controls
- 29% enroll in college compared to 77% of controls
- Homework performance predicts long-term academic success among individuals with ADHD

Interventions for Homework Performance and ADHD
- Homework-focused parent training
- Several studies showing benefits of individual BPT on children’s homework performance
- Improved parent-reported homework organization
- Stimulant medication
- No studies despite widespread pharmaceutical advertising and prescriber belief that it helps
- Use of long-acting medications to improve behavior at home, including homework, nearly doubles the daily dose of medication

Study Design
- 75 children were randomly assigned to receive 6 sessions of HW-focused, group behavioral parent training and a Daily Report Card (BPT + DRC)
- Also enrolled in a medication (Concerta) cross-over study in the summer treatment program setting (R01-MH099030)
- Allowing for analysis of separate and combined behavioral intervention and medication effects

Conclusions
- No beneficial effect of long-acting stimulant medication (Concerta) on homework completion or accuracy
- Significant beneficial effect (e.g., “C” performance to “B” performance) of group BPT focused on parent’s structuring and overseeing child’s homework
- No incremental value of adding medication to the homework-focused BPT

Evans et al., 2001; Langberg et al., 2011; Power et al., 2014
The Effects of Stimulant Medication on Classroom Learning in Children with ADHD
Pelham et al (under review)

Participants
- Participants were 240 ADHD children between 6 and 12 years old recruited over four consecutive cohorts from 2013-2016.
- They participated in a year-long NIMH-funded study examining tolerance to stimulant medication with both summer (STP) and school-year components.

Participants

Design—STP Classroom Study
- Placebo-controlled cross-over study of methylphenidate (Concerta) in an STP classroom setting in which grade-appropriate, structured lessons were taught in social studies, science, and vocabulary.
- Children received self-contained three-week modules of each topic on medication and placebo with order randomized across children
- Amount of learning was assessed at the beginning and end of each module.

Results and Conclusion
- Children made very large gains in knowledge acquired from excellent instruction in all three content areas.
- There were no effects of medication on amount of academic material learned. Medication had expected positive effects on classroom behavior, but this did not translate into improved learning of academic material.
- Results are consistent with the past 50 years of research on medication—no beneficial effects of stimulant medication on achievement in children/teens with ADHD.

Medication Effects on Indices of Learning and Classroom Behavior

Summary of the Program of Research

Implications of these Studies for Evidence-based Treatment of ADHD
- Focus on impairment in daily life functioning rather than DSM symptoms, need for matching, teacher and child skills, and school performance, rather than parent reported skill improvements, poor relationship of impairment, and worse impairment in early treatment
- Depending on severity, start with low dose behavioral treatment (parent, teacher, child), and evidence-based academic interventions if needed
- Add medication on more severe Behavioral Interventions when impairment is not maximized: parent/child
- Start low dose of medication and titrate up to on just as it becomes needed or for any interaction with behavioral/parental interventions
- Begin by using the 12-hour medications
- Once medication is used initially as first line, the average child's outcome will be worse than alternative no medication or subsequent treatments are used
- Medication alone is a completely ineffective treatment for ADHD, especially in the long run.
Additional Clinical Recommendations for Evidence-based Psychosocial Treatment of ADHD

- Start behavioral and academic interventions as early an age as possible and continue—reading example and severity of social problems
- Stay in regular contact with family to monitor both behavioral treatments and medication—chronic condition model of treatment
- Make interventions feasible for and palatable for families so they will be maintained in the long run
- Effective treatment requires systems cooperation (e.g., collaboration between families, schools, mental health clinics, primary care, payers) and a public health perspective and effective governmental contingencies for payment to providers

Downloadable Materials and Videos (Free) on our Websites
http://ccf.fiu.edu and www.effectivechildtherapy.fiu.edu

Additional Suggestions for Research and Practice in the Future of Treatment for ADHD

- Predicting from baseline measures which children should get what treatment—e.g., cognitive testing, neuroimaging, genetics? Nothing has panned out with this approach in the past 50 years.
- Developing simple measurement tools for home and school implementation of the “stepped care” treatment model we have been studying—e.g., IRS.
- Incorporate new technologies (e.g., telehealth, web apps)? E.g., EMA using cell phones in parent training
- Much more study of transitions beyond childhood—only a dozen or so studies on adolescents and even fewer on transition post H.S. to young adulthood

Thank you!