Current Practice in ADHD
Psychological Treatment
CBT-EF

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Impairment in Adulthood
Educational & Occupational

- Complete fewer years of education
  - High School drop-out rate (MKE[1] 32% vs. 0)
  - Fewer enter college (22% vs. 77%)
  - Fewer graduate college (5% vs. 35%)
- More likely to be un- or under- employed
  - More likely to be fired (55% vs. 23%)
  - Change jobs more often
    - (2.7 vs. 1.3 over 2-8 y post HS)
- Lower SES (standard of living)

[1]MKE=Milwaukee Young Adult Outcome Study (Barkley)

Comorbidity
Associations of Current ADHD with Co-morbid Disorders(12-mo)

		ODDS RATIO
Any mood disorder	38.5%	5.0
Any anxiety disorder	47.1%	3.7
Any substance use disorder	15.2%	3.0

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Kessler, R. C. et al. (2006). *Amer J of Psychiatry, 163*, 716-723

Executive Dysfunction in ADHD

- Definition of Executive Functions:

  "Self-directed actions needed to choose goals and to create, enact, and sustain actions toward those goals"

  - Barkley, R.A., *Executive Functions: What They Are, How They Work, and Why They Evolved*, Guilford, New York, N.Y., 2012

- Executive dysfunction correlates highly with overall impairment in adults with ADHD

  - Barkley, R.A. and Fischer, M., *Developmental Neuropsychology*. 36 (2010) 137-161. Also Children , Adolescents, and College Students

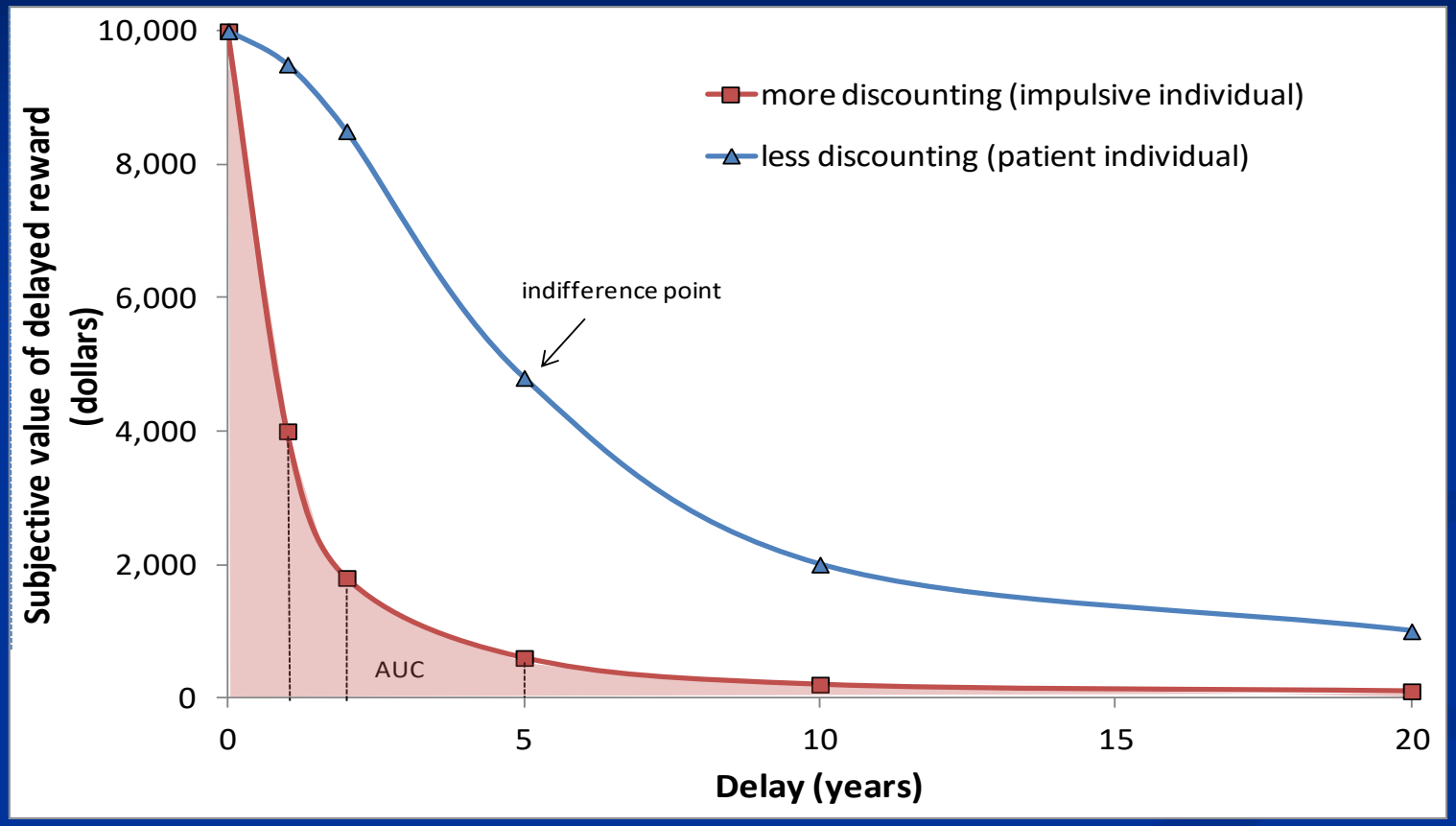
- Insufficiently remediated by stimulant medication

  - Biederman, J., Mick, E., Fried, R. et al., *European Neuropsychopharmacology*. 21 (2011) 508-515

Substrates of Dysfunction in ADHD

- Executive Functions –
  - Fronto-parietal, fronto-striatal and ventral attention networks
    - Working memory (verbal and visual-spatial)
    - Inhibitory control
    - Vigilance (Focus and duration of attention)
    - Planning/organization
- Reward Threshold:
  - Under-activation of dopamine neurotransmitter (mesocortical, mesolimbic, nigrostriatal tracts)
    - Preference for tasks that are novel, stimulating, rewarding
    - Correspondingly low tolerance for effortful, repetitive, non-gratifying tasks (like use of a planner!)
    - Lower motivation (Volkow et al, 2011) > procrastination, avoidance
  - "Temporal Discounting"
    - Preference for "smaller sooner over larger delayed rewards"
- "Time-blindness" Faulty Time Awareness, Time Estimation
- Emotional Aversion due to history of failure experiences

Hyperbolic Discounting Curve



Scheres, A. De Water, & Mies, Cognitive Science, 2013

Targets of CBT-EF Intervention

- Procrastination
  - Most abiding/universal problem
  - Multiple determinants

    Aversiveness of the task (Difficult, boring, lengthy)

    "Why do it now?" (Poor planning, Poor time-awareness)

    "It's already too late > why start?"

    Anxiety, self-doubt,/self-criticism, perfectionism
- Prioritization: What to do first/next? Likely to choose what is most appealing stimulating or salient at the moment
- Distraction Control: External and Internal: Sensory and Social
- Organization –Even if system is set up, it is not maintained
- Planning
  - Beginning and Completing Short- and Long-term Projects
- Irrational/Negative Self-Statements/ Cognitive Distortions

Specific Strategies - 1

- Planner Use -

  "If it's not in the planner, it doesn't exist!"

  - "Commandments"
  - Time-Awareness (Self-timing, and time-logging exercises)
- Procrastination –
  - ***"If I am having trouble getting started….the first step is too big."***
  - Chunking – Overcomes inertia and conditioned aversion
  - Boost self-esteem, self-efficacy –
    - Combat anxiety, irrational self-statements

Specific Strategies - 2

- Distraction Control: Internal & External; Sensory & Social)

  Out of sight, out of mind, In sight, in mind

  - "Turn off" Sensory Distracters
    - Turn off Phone-mail, Email alerts
    - Choose quiet workspace
    - Use Headphones
  - "Turn off" Social Distracters
    - Create Limits – Personal Space
  - Reduce ***Internal*** Distracters
    - Self-critical, self-doubting ruminations
      - Challenge Irrational Beliefs;
      - Role of Mindfulness

Specific Strategies - 3

- **Prioritization**

  First things First:

  All things must be done in order of Priority

  - **Identifying Priorities (Urgency-Importance Matrix)**
  - ***Must*** **have a prioritized plan for each day**
- **Planning**
  - **Goals and Sub-goals**
  - **Grounding in Time**
  - **Use Flow-Chart**
- **Organization**
  - ***"A place for everything, and everything in its place"***

Urgency X Importance Matrix*

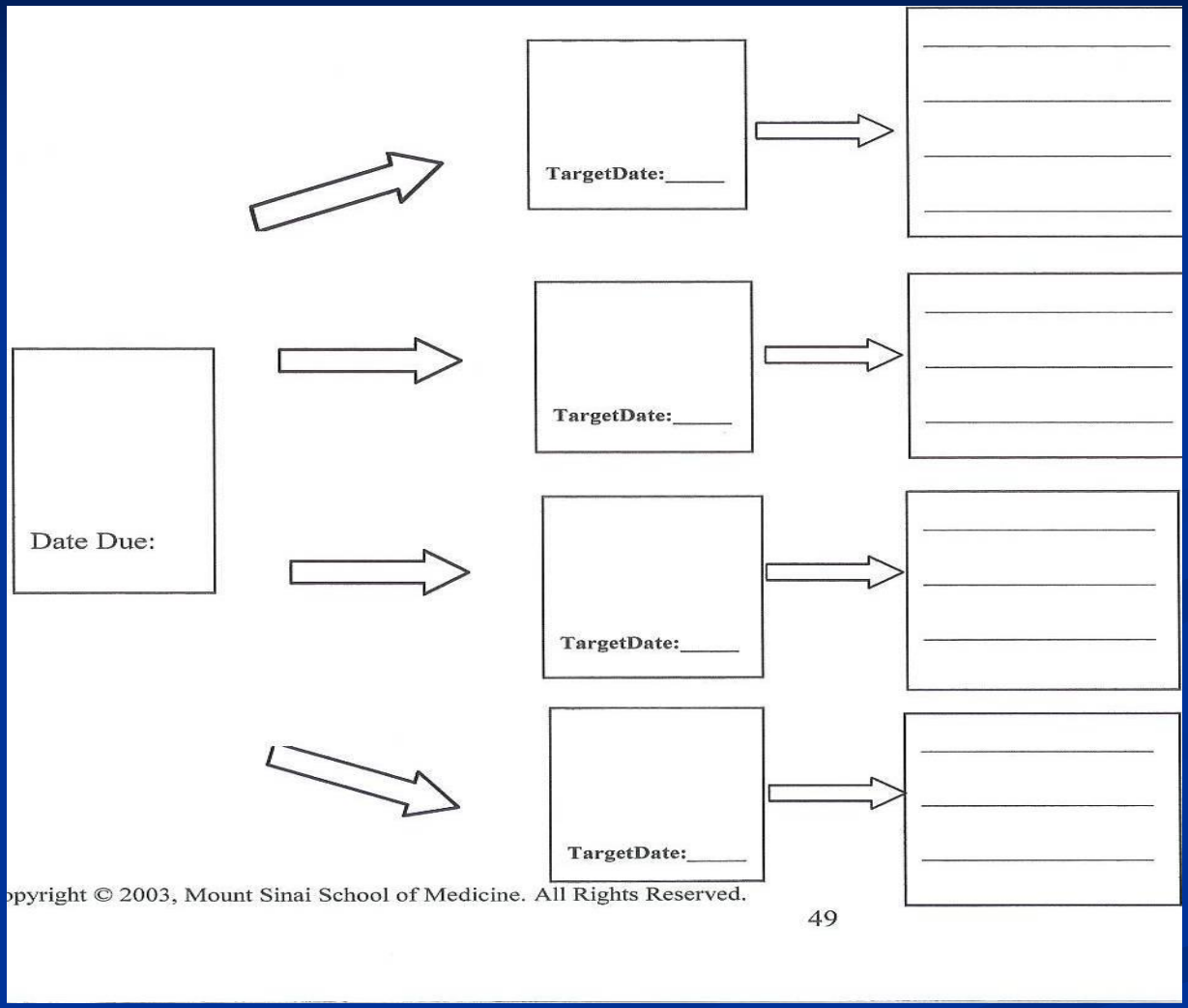
	URGENT	NOT URGENT
IMPORTANT	I- Impt & Urgent	II-Impt but not (yet) Urgent
NOT IMPORTANT*	III- Not Important but Urgent	IV- Not Impt & Not Urgent

*From: Covey, S. *The Seven Habits of Highly Effective People,* Used by permission.

Prioritization Work Sheet

Task	Date/ Deadline	Estimated Time Needed	Priority (1 to 5)	Scheduled for ___	Completed on___

Project Planning Flow Chart



Specific Strategies – 4
Combating Irrational Beliefs

- The original Cognitive-Behavioral Therapy (CBT):
  - Founded by Aaron Beck MD 50 years ago
- Irrational cognitions engender depression and anxiety. .
  - Overgeneralization
  - Disqualifying the Positive
  - All-or-None Thinking (Perfectionism)
  - Excessive "should" statements
- Identifying and Challenging these cognitive distortions
- Practice of Mindfulness to increase attentional focus, emotional self-regulation, self-calming

Temporal Discounting Implications for Intervention

- ***Decrease*** salience of ***immediate*** rewards
  - Removing ambient temptations (e.g. cell phone)
  - "Pre-commitment" (e.g. locking oneself out of websites)
- ***Increase*** salience of ***delayed*** rewards
  - Have patients actively visualize/mentally experience the long-term rewards contingent on present efforts
  - "Episodic Prospection" (Peters , 2010; Benoit, 2011)

Session Format

- Group modality: 6-9 participants/group
  - Adaptationfor individual therapy
- First Hour: Round-table Review of Home-Exercise
  - How did it go? What went wrong/right?
- Second Hour: Presentation of New Issue/Strategy
  - Socratic Method
  - In-Session Exercise to Illustrate Strategy
  - Review of Next Home Exercise
    - Anticipatory Trouble-Shooting

Home Exercises

- Choose one procrastinated task of less than 1 hour, schedule, complete it, and self-reinforce.
- Plan, prioritize and schedule one full day.
- Prioritize and schedule several tasks into a week.
- Select a space to be organized, divide into "zones"; schedule; complete one zone; self-reinforce.
- Plan a project (over 2 weeks) using flow-chart.

NIMH Treatment Development Award Study Design[1]

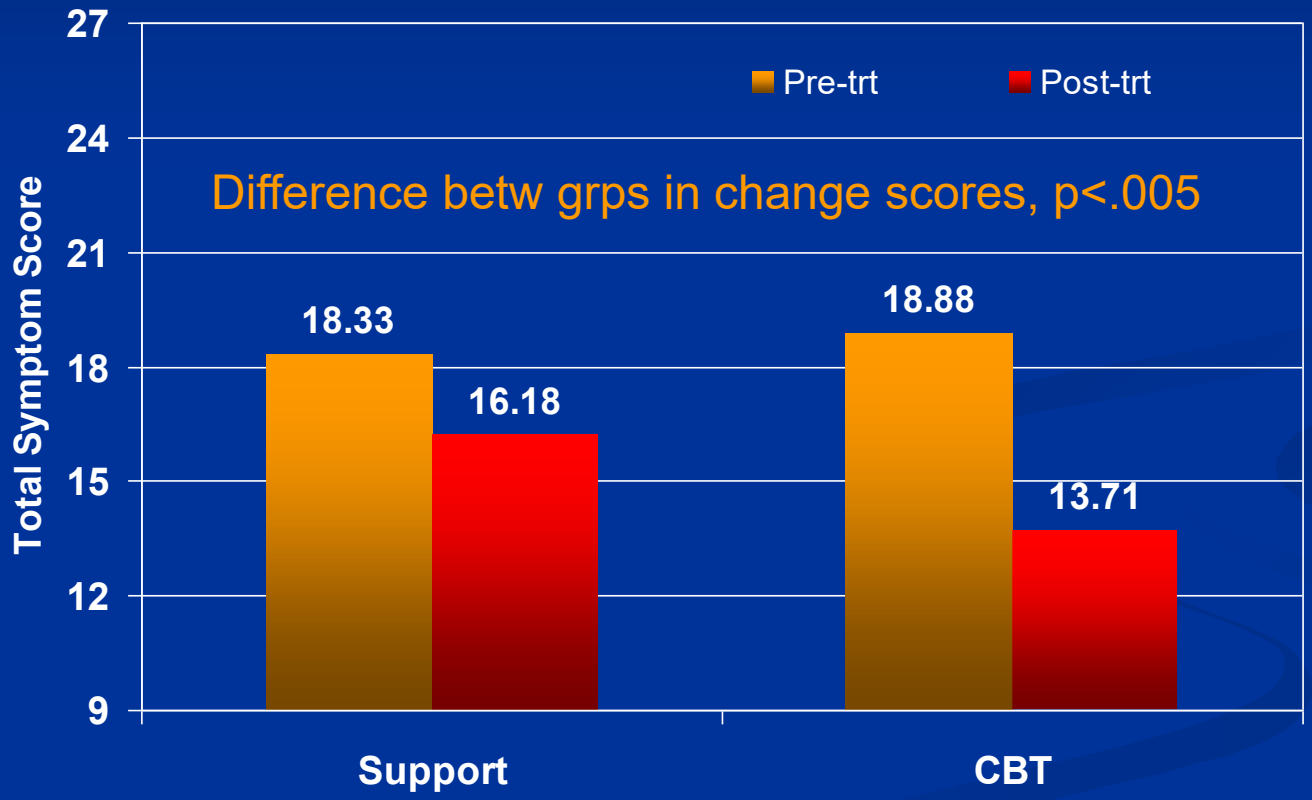
- 88 patients randomly assigned to CBT or Support
- Stratified with respect to ADHD drug tx (stabilized)
- Pre- and post-treatment assessments
  - Blind (Independent) evaluation for ADHD symptoms
    - AISRS - Adult ADHD Investigator Symptom Rating Scale (Adler, Spencer, and Biederman)
  - CAARS (Self & Observer, Long Form)
- Discourage changes in other treatments during study

[1]Solanto, M. V., Marks, D. J., Wasserstein, J. et al. (2010). *American Journal of Psychiatry*.

Sample Characteristics
Clinical

	CBT (n=45)	Support (n=43)
Subtype:	69% Inattentive	65% Inattentive
Meds for AD/HD:	20 (44%)	22 (51%)
Anx Disorder:	56%	54%
Mood Disorder:	29%	35%

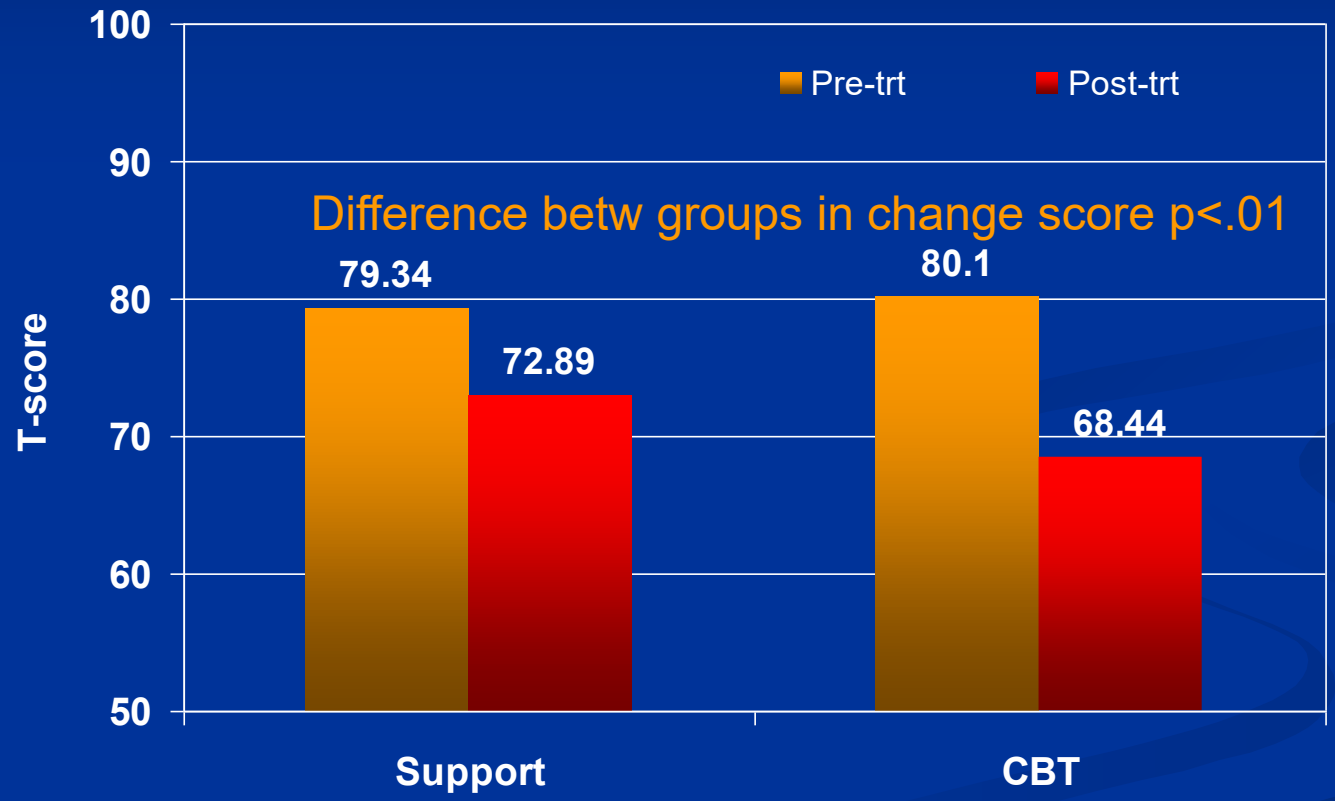
Adult ADHD Structured Interview for DSM-IV - inattentive symptoms (AISRS-IN)



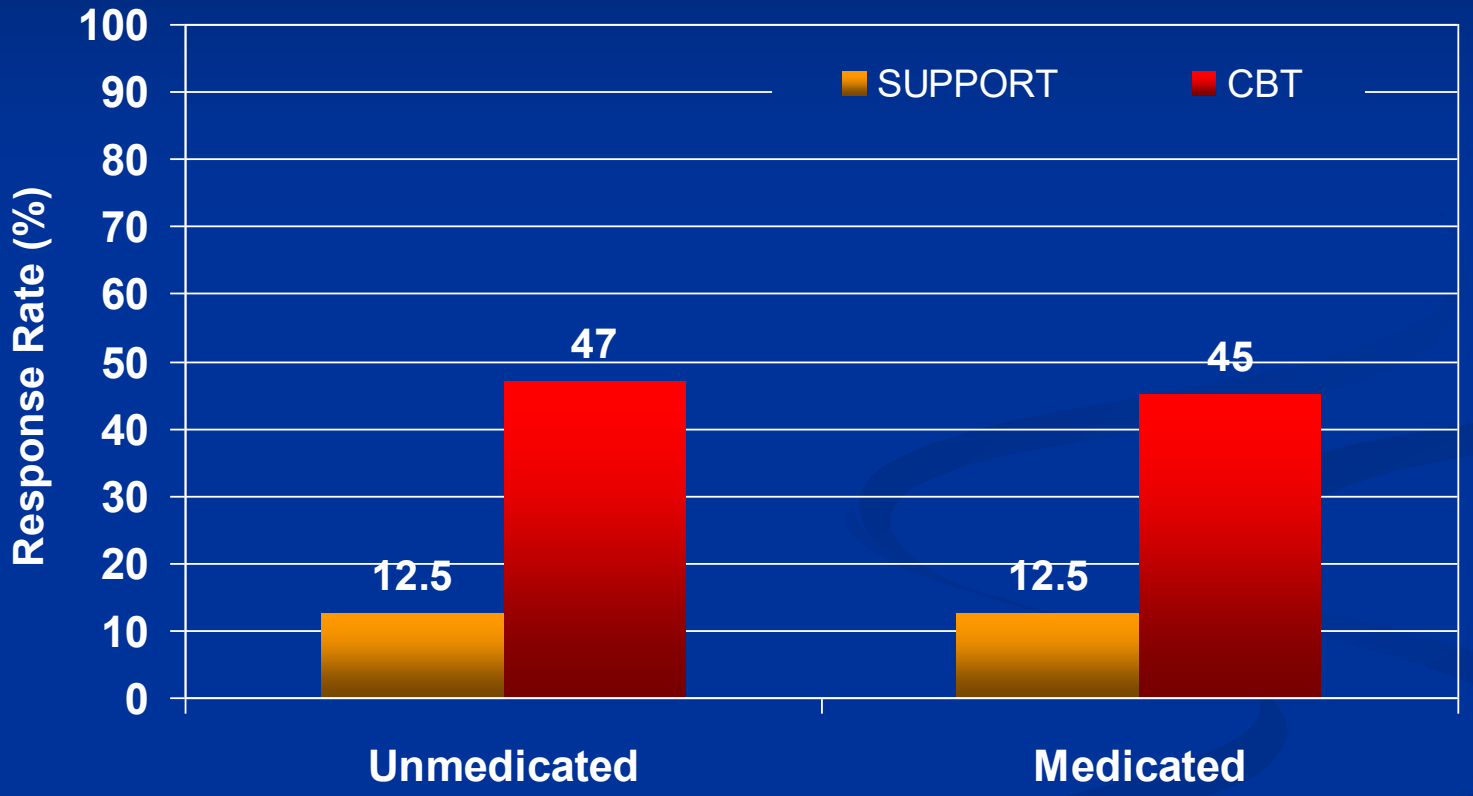
AISRS-IN is the subset of Inattentive symptoms on the Adult ADHD Investigator Symptom Rating Scale

Conners' Adult ADHD Rating Scale (CAARS)

Inattention Symptom Scale - Self



Effect of Medication Status on Response to Treatment (AISRS)



STRATEGIES RATED MOST HELPFUL

Strategy	Mean Rating on scale of 0 to 3 (SD)	% Rating "Very Helpful" (3)	% Rating "Moderately Helpful" (2)
Breaking down a task into parts	2.55 (0.77)	68%	22%
Using Planner Regularly	2.35 (0.84)	55%	28%
Identifying Irrational Beliefs	2.25 (0.90)	49%	34%
Changing Irrational Beliefs	2.07 (0.93)	39%	36%
Engaging the help of Others	2.00 (1.02)	42%	24%
Build up"Energy of Activation"	1.56 (0.80)	12%	39%
Contingent Self-Reward	1.65 (1.01)	27%	23%
Visualization of long term rewards	1.48 (0.97)	17%	32%

Meta-Analyses of CBT-EF

- Efficacy of CBT-EF

	Number of CBT-EF Trials	Design of Trial	Core ADHD Sx SMD (p=)
Young, Z. (2015)	k= 8 (RCT)	k=5 Wait-list k=3 Active Ctrl	0.76 (p=.006) 0.43 (p=.004)
Liu et al (2023)	k=17 (RCT)	All Wait-list TAU Active Ctrl	0.71 (p<.001) 1.03 (p<.001) 0.66 (p<.001) 0.32 (p=.005)

- Effects on Co-occurring Symptoms
  - k=20 RCT's of CBT-EF (5 with active controls):
    - Improvement in anxiety, depression, emotion dysregulation, quality of life. (Lopez-Pinar, 2020).
- Effects of Combination Treatment
  - k=6 RCTs: CBT-EF + Stimulant Medication > Medication alone (Li & Zhang, 2024).

College Students with ADHD

- National survey of 123,000 students by the American College Health Association (2013) found:
  - 8% of students on US campuses report ADHD dx*
  - 5.9% said ADHD adversely affected academic performance*
- Lower Grade Point Average (GPA) (Advocat, 2011)
- More likely to withdraw from courses (Advocat, 2011) be placed on probation (Heiligenstein, 1999), or drop out of school (Barkley, 2006)

Comorbidities in First-Year College Students with ADHD*

	ADHD (n=228)	Comparison (n=228)
Depression (MDD)	28.2%	3.6%
Dysthymia/Depr NOS	8.1%	1.8%
Anxiety	27.1%	4.1%
GAD	15.0%	1.8%
Anxiety NOS	7.7%	0.9%
Social Phobia	3.2%	0.4%
OCD	3.6%	1.8%
Learning Disability	10.4%	0.4%

*Anastopoulos:, A.J Clin Child Adolesc Psychol. 2016 Feb 6:1-12

Modifications for College Program

- Same strategies, different contexts, cues, consequences
  - e.g. social media distractors; late & missed classes
- More Psychoeducation about ADHD
  - Manifestations,Treatments, Care of Brain & Body
- Specific Applications to Academic Tasks
  - Active Reading
    - Setting discrete goals in minutes or pages
    - Active self-questioning
  - Listening and Note-Taking in Lectures
    - Outlining to capture "skeleton" of the Lecture
    - In-session practice listening to a TED talk
  - Researching and Writing Papers
    - Creating a Time-Line; Outlining before Writing

Applications to Academic Tasks

- Active Reading
  - Establish a reasonable goal in minutes or pages
  - Scan headings, sidebars, tables for the main ideas
  - Active self-questioning

- Listening to Lectures
  - Outlining to capture the "skeleton" of the lecture
  - In-session exercise listening to a brief taped lecture
    - (e.g., TED talk)
  - Use of a recording "smart-pen" (e.g., Livescribe)

- Researching and Writing Papers
  - Provided templates for outlining various types of papers
  - Creating a time-line for components
    - Grounded in appts with Professor
  - Create an outline using Power Point

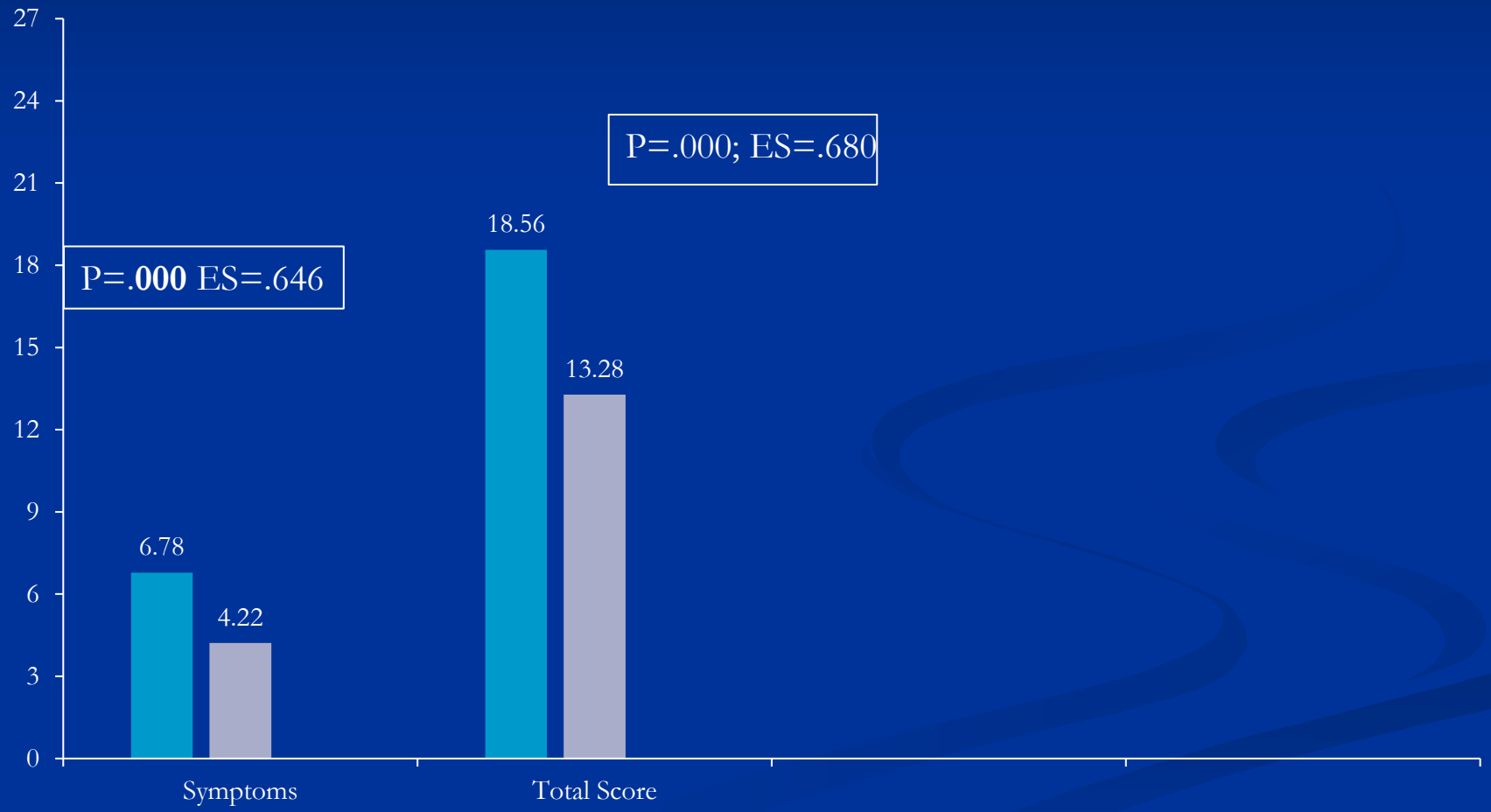
Netherlands Pilot Study

Solanto & Scheres (2021). *J Atten Disord, 25,* 2068-2082

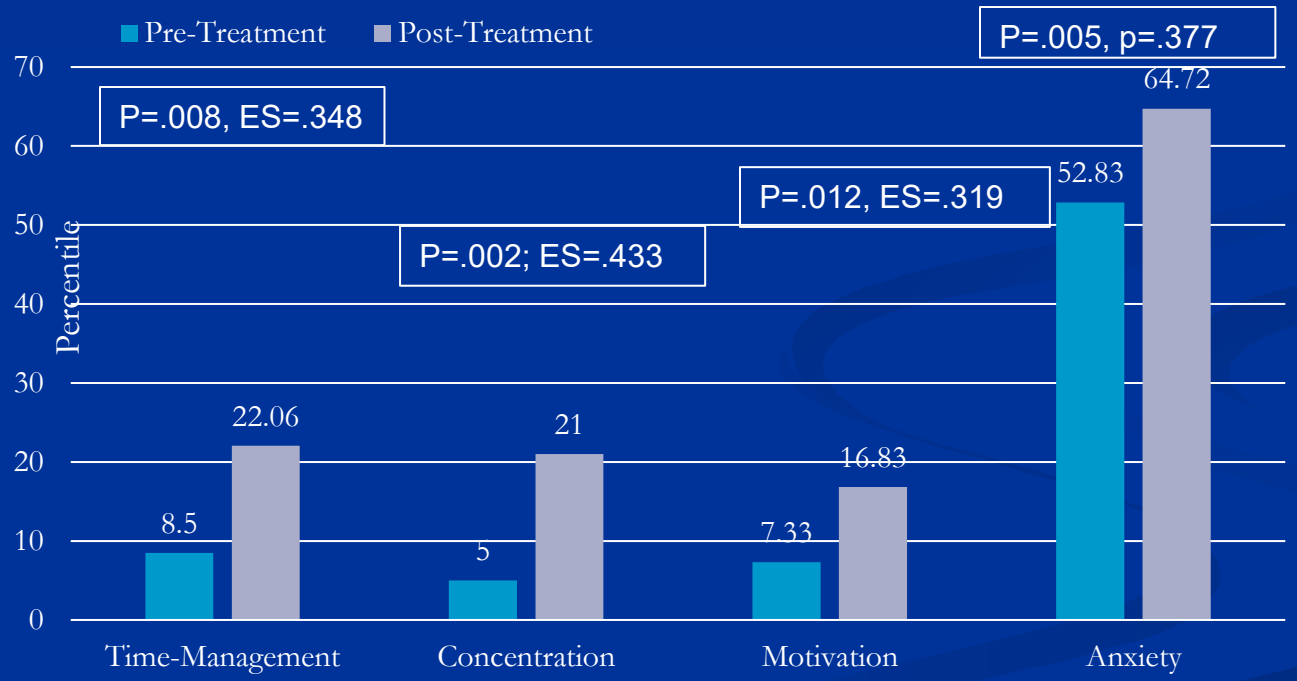
Total Sample	N=18 (two groups of 9 students)
Gender	8 males, 10 females
Age	Mean = 23.63 yr (SD = 2.75)
University Status	Bachelor's Students n=15 (first through fifth years)
	Master's Students n=3
ADHD Medication	None: n=11 (61%)
	Stimulants: n=5 (28%)
	Non-Stims: n=0
	Other Psychotropic n=2 (11%) (buproprion, fluoxetine)
Psychotherapy	n=2 (11%)
ADHD Subtype	Predominantly Inattentive =10; Combined = 8
Comorbid Diagnoses	Anxiety: n=6 (GAD, Social Phobia, OCD) Depression: n=2 (MDD, Dysthymia)
AISRS - Inattentive Symptoms	Mean = 6.78 (1.99); Range = 4-9
AISRS - Hyperact-Impulsive Sympt	Mean = 2.89 (2.00); Range = 0-7

Adult ADHD Structured Interview (AISRS) DSM-5 Inattention Symptoms

Solanto, M. V., & Scheres, A. (2021). *J Atten Disord, 25(25), 2068-2082.*



Learning and Study Skills Inventory (LASSI)



NIMH Treatment Development Award (R34) Phase I

- Co PI: Anthony Rostain MD
- Site PI: Sarah O'Neill, Ph.D.
- Site: City College of New York

- Specific Aims Phase I (Completed)
  - Iteratively revise and refine our previously piloted* CBT-EF intervention
    - via input from Students, Investigators, and Counselor-Trainees
  - Train campus Counseling Staff to deliver the Group Intervention)
  - Assess the effectiveness of the intervention in an open trial vis-à-vis core ADHD symptoms (AISRS) & EF (LASSI)
  - Assess mediation of effects via targeting EF

*Solanto & Scheres (2021). *J Atten Disord, 25,* 2068-2082

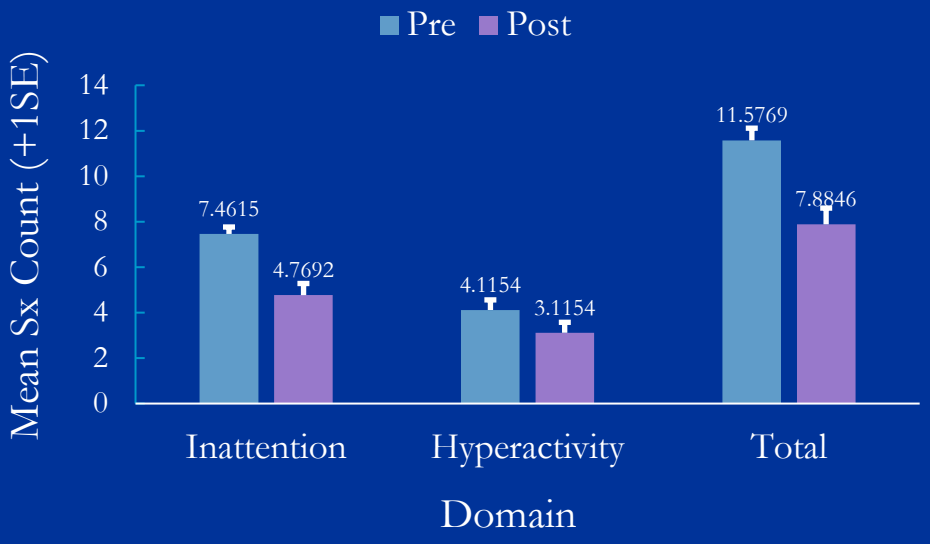
N=41
Age M=21.81, SD = 2.75 (18-30 yrs)
n=27 "completers"

Gender	Race	Ethnicity	Adult Diagnosis	Medication	Psychotherapy (Lifetime)
• Women: n=29 (71%) • Men: n=12 (29%)	• AI/AN: n=2 (5%) • Asian: n=11 (27%) • Black: n=13 (32%) • NH/PI: n=0 (0%) • White: n=8 (20%) • Not stated: n=7 (17%)	• Latine: n=12 (29%)	• Inatt: n=19 (46%) • Hyp/ Imp: n=1 (2%) • Combined: n=21 (51%)	• Current • Yes: n=3 (7%) • Lifetime • Yes: n=7 (17%)	• Yes: n=26 (63%)

Significant improvement in ADHD symptoms & severity: structured interview (AISRS)

(data from 27 "completers")

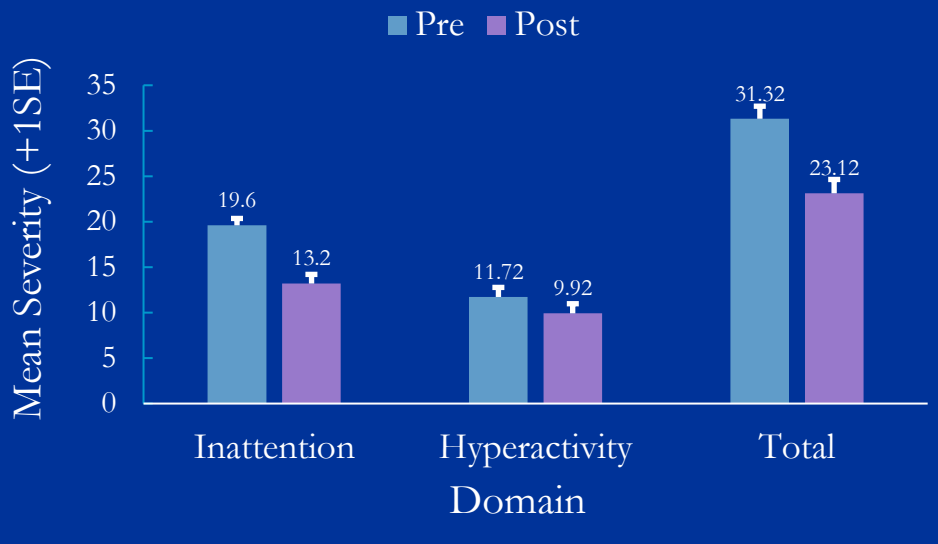
Symptom Count



Pillai's trace = 0.53, F(2, 24) = 13.53, p < .001, η_p^2=.53

Follow up univariate tests:
Fs (1, 25) = 5.33-25.95, all p ≤ .03, η_p^2=.18-.51

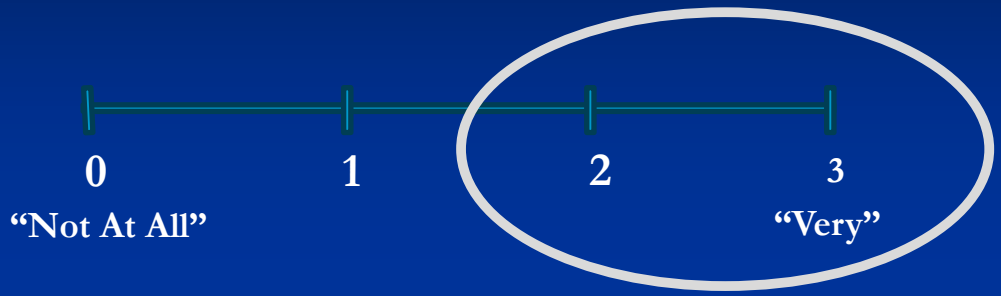
Severity

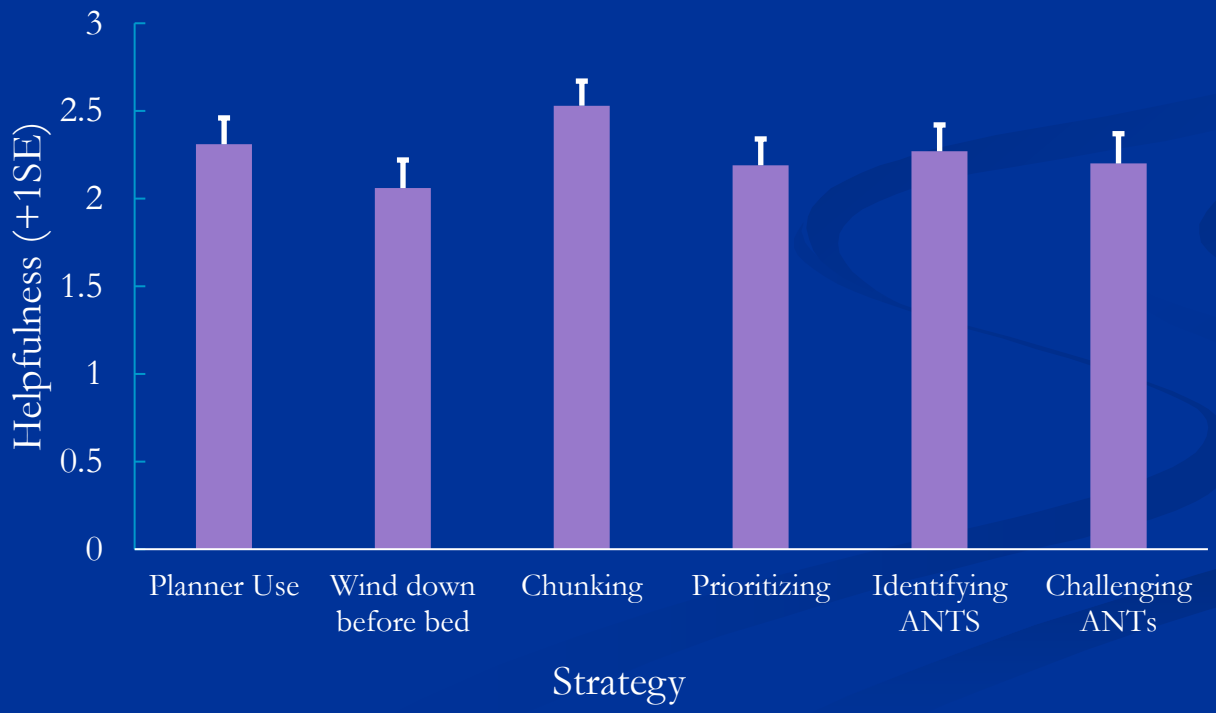


Pillai's trace = 0.67, F(2, 23) =23.74, p <.001, η_p^2=.67

Follow up univariate tests:
Fs (1, 24) = 6.57-49.32, all p ≤ .017, η_p^2=.22-.67

Participants identified the most helpful strategies





NIMH Treatment Development Award (R34) Proposed Phase II

- Co PI: Anthony Rostain MD
- Site PI: Sarah O'Neill, Ph.D.
- Site: City College of New York

- Specific Aims: Phase II
  - Conduct a large-scale RCT of the intervention with an "active control" group
  - Assess efficacy as administered by Counselors trained in Phase I
  - Refine and assess the comprehensive training program for counselors
  - Disseminate training and treatment origrans and manuals across college campuses

Publications

- College Pilot Study
  - Solanto, M. V., & Scheres, A. (2021). Feasibility, Acceptability, and Effectiveness of a New Cognitive-Behavioral Intervention for College Students with ADHD. *J Atten Disord,* 25 (14), 2018-2022..
- Adult Efficacy Study:
  - Solanto, M. V., Marks, D. J., Wasserstein, J. et al. (2010). Efficacy of meta-cognitive therapy (MCT) for adult ADHD. *American Journal of Psychiatry, 167*(8), 958-968.
- Adult Treatment Manual:
  - Solanto, M.V. (2011) *CBT for Adult ADHD: Targeting Executive Dysfunction* (2011),Guilford Press, N.Y.

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General Strategies to Facilitate Positive Autonomous Habit Development

- Reinforcement (praise) by Therapist and Group for small steps
  - Reinforce successive approximations to change
  - Encourage positive behaviors until they become autonomous – self-reinforcing ie yield long-term (vs. short-term) rewards
- Modeling and Vicarious Reinforcement (Group)
- "Exhortation" – Positive prediction/*Anticipated* Reinforcement
  - "Why this experience (eg with planner) will be different"
  - "Like building a muscle"
  - Others with ADHD have succeeded
- "Pre-Commitment" eg via software – combats impulsivity/response to immediate stimuli
- Combat anxiogenic and depressogenic self-statements

Strategies to Facilitate Positive Autonomous Habit Development - continued

- **MANTRAS -** facilitate adaptive cognitions – keyed to the problem situation
- **HOME EXERCISES –** implementation in the field
- Link new habit to an existing one
  - E.g. take pill when brush your teeth;
  - E.g. Check planner when you drink your coffee
- Make use of visuals for increased salience
  - E.g. blow-up of schedule on computer screen
  - E.g. Basket at entryway for keys etc.
  - Visualize ***oneself*** completing a complex task, which requires thinking through how you will approach it