



Behavior Therapy for Tics

Susanna Chang, Ph.D.

Child OCD, Anxiety, and Tic Disorders Program

**UCLA Semel Institute for
Neuroscience and Human Behavior**



Rationale for Behavioral Treatment

- **The environment can effect symptoms in persons with TS**
- **These effects are unique to the individual**
- **To develop a useful treatment both the external and internal factors that maintain tics must be addressed**



Factors Inhibiting Use of BT for Tics

Historical Context

Psychodynamic conceptualization of TS during much of last century resulted in largely ineffective treatments, increased stigmatization of TS patients, and rejection of psychotherapeutic interventions by the TS community (both patients and practitioners).

The success of pharmacological interventions mid-century led to further rejection of nonbiological treatments and increased emphasis on tics as involuntary and attempts at suppression as harmful



Factors Inhibiting Use of BT for Tics

Negative Effects of Tic Suppression

- “tics as hydraulic system”

Suppression leads to Rebound effects

- Not supported in empirical literature (e.g., Woods et al.)

Suppression leads to Symptom substitution

- Confounded with waxing and waning course
- Not supported in empirical literature

Focusing on tics makes them worse

- Perhaps transiently but not long-term



Factors Inhibiting Use of BT for Tics

Misunderstandings about Behavior Therapy

Assumes tics are not biologically based

- This is false

Habit Reversal just replaces tic with competing response

- CR fades over time as premonitory urge dissipates

Patients punished for ticcing or forced to suppress their tics

- Inaccurate belief

Initial published HRT studies overly positive

- “durable elimination of tics following one session of HRT”

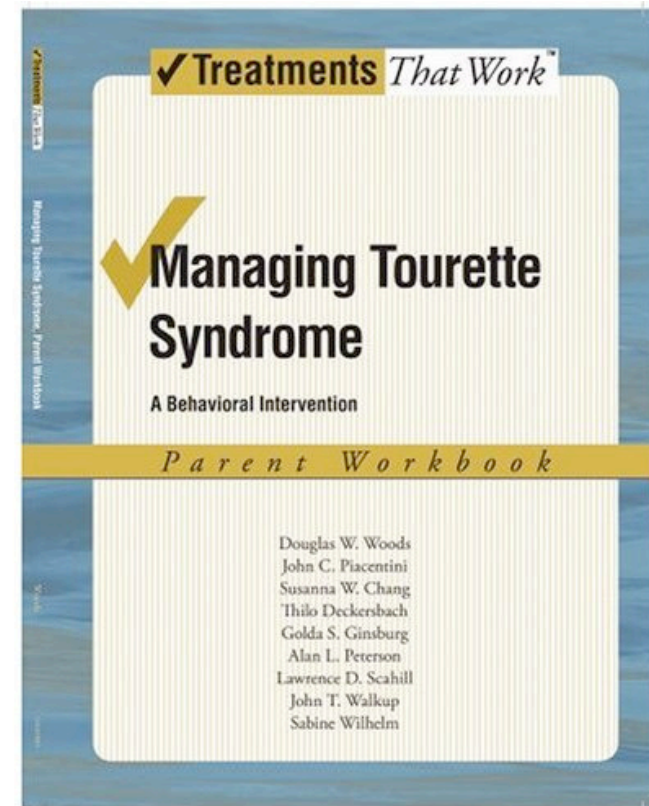
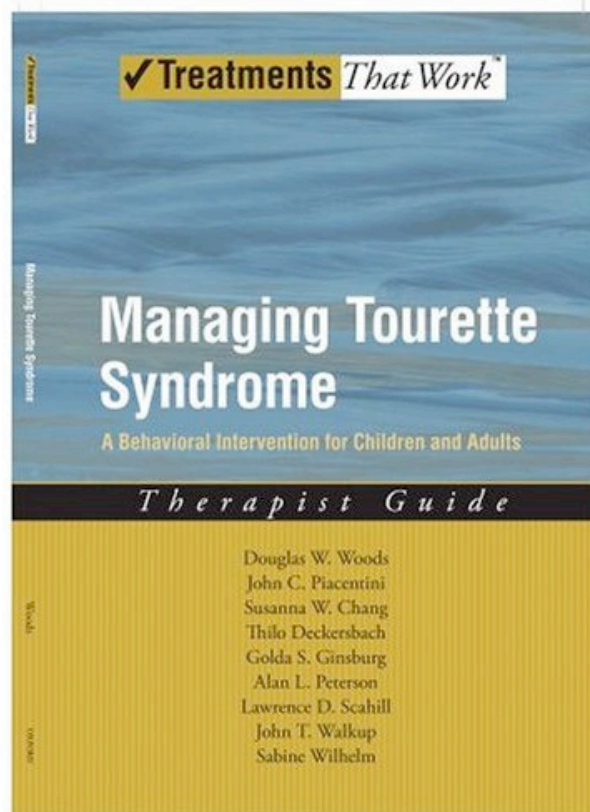


Behavioral Treatment

Comprehensive Behavioral Intervention for Tics (CBIT)

- **Function-based Intervention** used to address external factors in an individualized fashion
- **Habit Reversal Training** used to address internal factors

CBIT Treatment Manuals





Function-Based Interventions

- Purpose is to identify environmental events that be exacerbating or maintaining tics for a given child
- These events are then modified in the service of tic reduction
- The child's reactions to the events are modified in the service of tic reduction



Function-based Interventions

- Does not imply that tics are behaviorally caused or child is manipulating the system.
- Despite the tics, the child is still expected to be treated as “normally” as possible
 - both positive and negative consequences
- Tics should not dictate what the child does or does not do, and the child does not receive any special attention for his or her tics.
- Goal is to create a *Tic Neutral Environment*



Function-based interventions

- **Step 1:** Functional assessment
- **Step 2:** Developing interventions
- **Step 3:** Develop plan for implementation



Functional Assessment

- Interview patient and parent asking about antecedents and consequences associated with notable exacerbations of different tics
- In the interview, ask about reactions to the situations, cognitions that may be impacting the situation, etc.



Developing Function-Based Interventions

- Work with patient to develop different strategies to reduce tics given results of assessment
- Keep following points in mind....
 - Minimize or eliminate tic exacerbating situations when possible
 - Remove potentially reinforcing consequences to the tic in tic exacerbating situations
 - When entering tic-prone situations, the patient should be reminded to use HRT procedures



Function-based Interventions

- ADDRESS ANTECEDENTS
 - Provide child with 15 minutes warning and free time to calm down prior to making specific requests (homework, chores)
- ADDRESS *SOCIAL* CONSEQUENCES
 - Don't respond to tics in the moment - teasing, telling to stop, comforting, etc.
- ADDRESS *ESCAPE* CONSEQUENCES
 - If tics interfere, leave situation for 15 minutes then return - BUT no escape from responsibilities



Developing Function-Based Interventions

- Keep following points in mind....
 - For tic-prone situations that are not easily modifiable, teach patient strategies to minimize the impact of that situation
 - Teaching relaxation strategies for high stress situations
 - Teaching cognitive restructuring
 - Teaching scheduled activity or breaks
 - Minimize the impact of the tics on the child.
 - Educate peers, teachers and relatives about the child's condition



Develop Plan for Implementation

- Do functional assessment and develop a function-based treatment plan for a new tic each week.
- Discuss with the parents how the intervention would be implemented for the patient's particular situations
- Conduct any training necessary to implement the intervention



Habit Reversal Training

**Multicomponent Behavioral Treatment Package
developed by Azrin & Nunn (1973)**

**Targeted tics and other habit disorders, including
trich, nailbiting, thumbsucking, skin picking**

Originally consisted of 14 techniques aimed at:

- **increasing tic (habit) awareness**
- **developing competing responses to tics (habits)**
- **building and sustaining motivation and compliance**

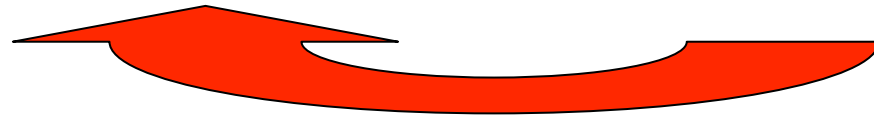
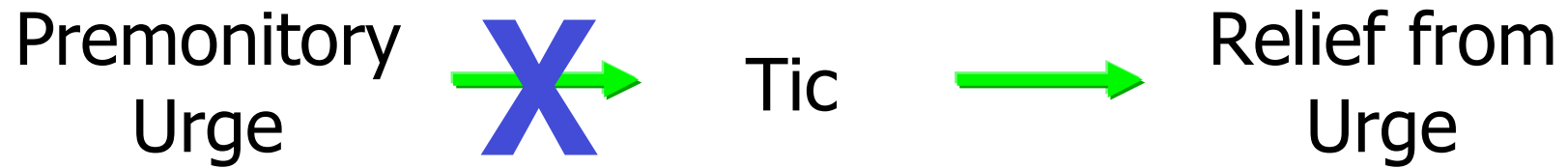


Habit Reversal Training

THREE PRIMARY COMPONENTS

- **Awareness Training**
- **Competing Response**
- **Social Support**

Internal Factors that Maintain Tics



Negative Reinforcement



Rationale for Awareness Training

“The next thing we’re going to do today is to teach you to know when you do your vocal tic. We are going to work on making you more aware of when your tic is happening. Because the rest of the treatment depends on you knowing exactly when your vocal tic is about to happen or is happening, this is a very important part of the treatment. If you want to learn to manage something, you first have to know when it is happening. We’ll do a number of exercises so that by the time you leave today, you will be very “aware” of your tic.”



Response Description

- Help patient define the tic in great detail, paying attention to muscular sensations and bodily placement
 - Fill in definition where necessary
- Describe sensations preceding tic
- Describe any bodily signals that suggest tic is imminent



Response Detection & Early Warning

- Therapist simulated practice (if necessary)
- Patient practice
 - Client tics ⇒ client acknowledges ⇒ Praise client
 - Client tics ⇒ client does not acknowledge ⇒ prompt client
 - Continue until at least 80% correct
- Patient simulates tics if they're not ticcing during session
- Early warning involves replicating these procedures with the internal cues to tic or the external signals that tics are imminent



Competing Response Training

- Purpose
 - Give patient a behavior to do that is physically incompatible with the tic urge or tic itself
- Three techniques
 - Choosing the Competing Response
 - Therapist simulation of competing response
 - Patient practice the competing response
- In contrast to tic suppression – CR training teaches the person to manage the premonitory urge rather than trying to resist the actual muscle contraction or vocalization



Choosing the Competing Response

- Three rules when choosing Competing Response
 - Incompatible with tic
 - Less socially noticeable/interfering than the tic
 - Patient can do CR for the required duration across multiple situations
- Choosing a Competing Response is mutual decision b/w patient and therapist



Sample competing responses

Tic

Competing Response

Arm Movements

Push hand down on thigh or abdomen and push elbow in towards hip

Eye Blinking

Systematic, voluntary, soft blinking consciously maintained at a rate of one blink per 3-5 seconds

Hand/wrist Movements

Push hands on arms of chairs, desk, leg, etc.

Head Jerks/Movements

With head in centered position, contract the neck flexors so that the head tilts slightly downward and the neck appears shortened. If this is inadequate, push chin into sternum



Sample competing responses

Tic

Competing Response

Leg Movements

Place feet flat on floor and push downward. If standing, lock knees

Mouth/facial Movements

Clench jaw while pressing lips together

Nose movements

Pull upper lips down slightly and press lips together

Copropraxia

Make fists and push elbows into side

Vocal Tics

Diaphragmatic breathing keeping in mind inhale/exhale pattern in context of tic



Competing Response Training

- Therapist demonstrates CR and proper implementation to patient
 - Contingent on tic or warning sign
 - Held for 1 min or until urge goes away....whichever is longer
- Patient demonstrates CR – therapist provides feedback
- Patient practices implementing CR in response to tic
- Patient practices implementing CR in response to tic warning sign
- Therapist prompts and praises as appropriate



Competing Response Caveats

- Research suggests that CR need not be physically incompatible to be effective, but it makes more intuitive sense to start with an incompatible response
- CR must be done contingent on tic or warning sign to be effective
- CR is held for 1 minute or until the premonitory urge goes away (whichever is longer)
- CR tends to fade as the tic fades



Social Support/Reward System

- Goal is to reinforce and prompt use of competing response
 - Significant others prompt use of CR
 - Significant others praise correct use of CR
 - Necessity of social support is unclear, but probably required for most children
 - Rewards offered for compliance with treatment assignments (effort not outcome)



Ancillary Components

- Psychoeducation
 - Reduce family anxiety/stress and negative reactions to child's tics
- Relaxation Training
 - Reduce child anxiety/stress



Preliminary Support for HRT

Over 25 published studies of HRT for TS/CTD

(7 Controlled trials – only two included children)

More effective than supportive psychotherapy, relaxation training or self-monitoring

(Peterson & Azrin, 1992; Wilhelm et al., 2003)

More effective than wait-list control

(Azrin & Peterson, 1990)

Well-established treatment by APA Div 12 criteria

(Cook & Blacher, *Clinical Psychology: Science & Practice*, 2007)

Deficits in response inhibition predict worse treatment response

(Deckersbach et al., 2006)

Works equally well as monotherapy or adjunct to medication

(Chang & Piacentini, in prep; Wilhelm et al., 2006)

All existing studies are single-site with small sample sizes



Structure of CBIT Therapy

- 8 standard sessions, plus booster sessions
- Sessions are 60-90 minutes
- Parents and children both participate in therapy experience
- Therapy framed as a collaborative effort



CBIT Session 1

- Welcome patient and family to treatment (rapport building)
 - Discuss strengths, brief family, developmental, and academic history
- Review history of tic disorder and related problems
- Rationale for HRT
- Create Tic Hierarchy
- Present the rationale for the behavioral reward program and illustrate how it works
- Self-Monitoring Training and Weekly Homework



CBIT Session 2

- Review events of past week and update tic hierarchy
 - Note significant life events
 - Obtain one positive event in child's life since last time
 - Review and update hierarchy
- Review Homework and Behavioral Reward Program
- Psychoeducation about tic disorders
- Create Inconvenience Review



CBIT Session 2

- Implement HRT for First Tic
 - Awareness Training
 - Competing Response Training
 - Social Support
- Conduct functional assessment and implement function-based intervention for first tic
- Homework
 - Child will use CR during planned monitoring times and unplanned periods
 - Monitoring will continue



CBIT Session 3

- Review events of past week
- Review Homework
- Inconvenience Review
- Psychoeducation about tic disorders
- Practice CR for Tic #1
- Select another tic and conduct HRT for Tic #2
- Homework



CBIT Sessions 4-8

- Review events of past week
- Review Homework
- Inconvenience Review
- Practice CRs (in vivo or imaginal) for previous tics
- Select another tic and conduct HRT for next tic on hierarchy
- Homework



Child CBITS Study

Recruitment Sites

UCLA (PI: Piacentini)

Johns Hopkins University (PI: Walkup)

University of Wisconsin – Milwaukee (PI: Woods)

Data Center and Statistical Analysis

Yale Child Study Center (PI: Scahill)

Supporting Sites

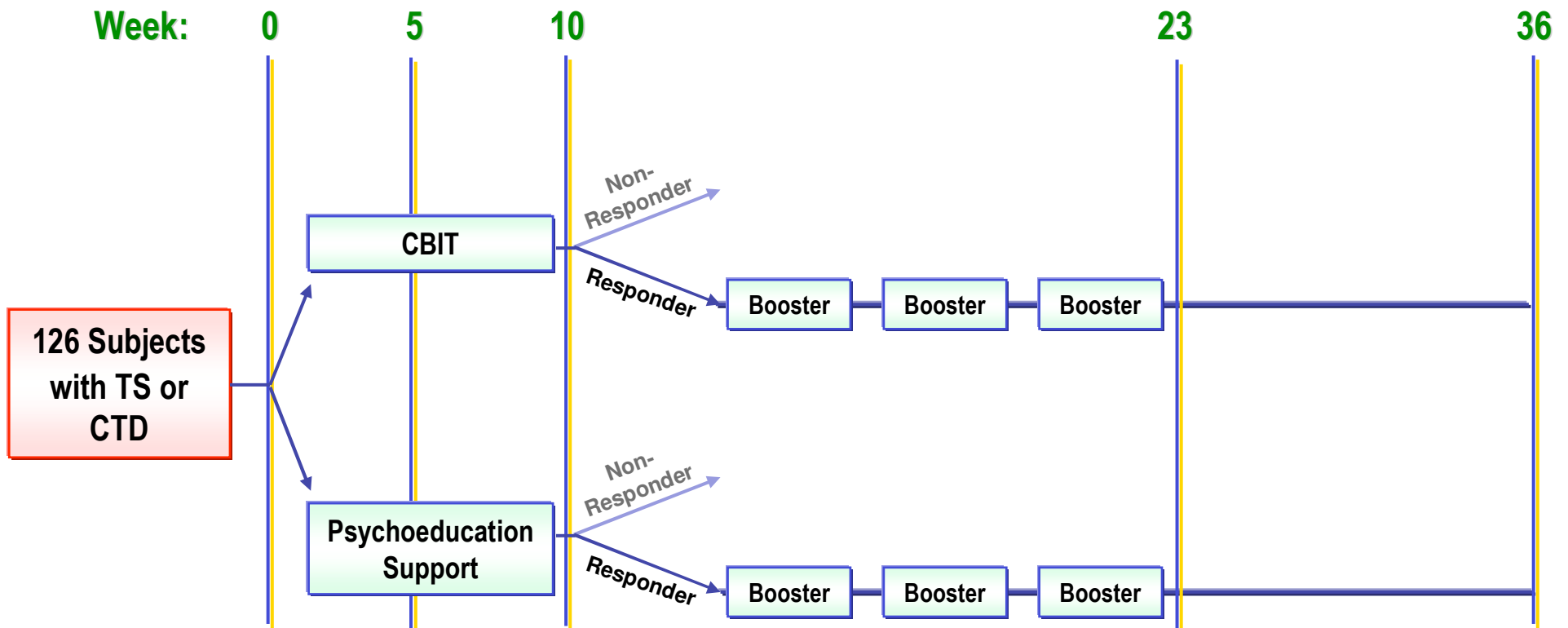
MGH/Harvard (PI: Wilhelm - Treatment Fidelity)

U Texas San Antonio (PI: Peterson - Direct Observation Coding)

TSA (Sue Levi-Pearl - Recruitment)

CBITS Study Design

Assessment Schedule:





Control Treatment

Psychoeducation-Supportive Therapy (PST)

PST provided supportive psychotherapy and education about tic disorders and was designed to mimic recommended adjunctive components of psychopharmacologic treatment.

Patients and their parents were allowed to discuss tics and related issues, but therapists were prohibited from providing direct instructions about tic management

Psychoeducation included information about TS phenomenology, prevalence, natural history, causes, and common comorbidities associated psychosocial impairments



CBITS Eligibility Criteria

Inclusion

- **Age 9 to 17**
- **Primary diagnosis of DSM-IV-TR TS or Chronic Tic Disorder**
- **CGI-Severity > 3**
- **YGTSS Total Score > 14**
- **Unmedicated or stable medication for at least 6 weeks with no planned changes**
- **Child speaks fluent English**
- **Informed parental consent and child assent**



CBITS Eligibility Criteria

Exclusion

- **YGTSS Total Score > 30 (unless approved by caseness panel)**
- **IQ < 80 on Wechsler Abbreviated Scales of Intelligence (WASI)**
- **Primary diagnosis of DSM-IV-TR TS or Chronic Tic Disorder**
- **CGI-Severity > 3**
- **Excessive/problematic substance use or CD past 3 months**
- **Lifetime diagnosis of DSM-IV PDD, Mania, Psychotic Disorder**
- **Any serious medical or psychiatric illness requiring immediate treatment other than provided in CBITS protocol**
- **Previous treatment with 4 or more sessions of HRT**



Primary Outcome Measures

Yale Global Tic Severity Scale (YGTSS) Total Score

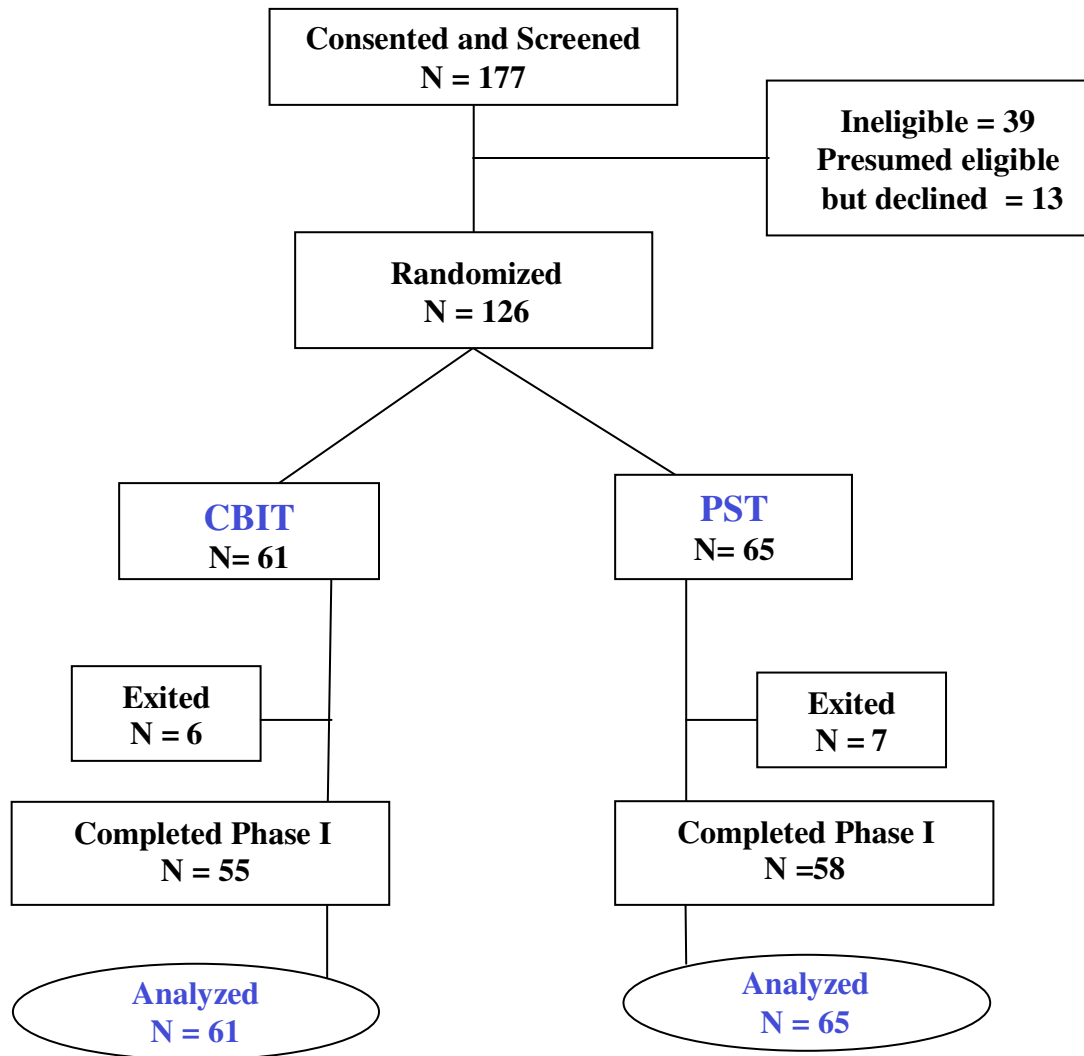
- Number of tics
- Frequency
- Intensity (forcefulness)
- Complexity
- Interference

YGTSS Impairment

Clinical Global Impression (CGI) – Improvement Scale

Parent Tic Questionnaire (PTQ) Total Score

CONSORT: Study Flow





Sample Characteristics

	CBIT N=61	PST N=65
Mean Age (SD)	11.6 (2.3)	11.7 (2.3)
Gender (% Male)	75.4%	81.5%
WASI IQ (M, SD)	111.7 (13.5)	108.6 (14.0)
Stable Tic Meds at Entry (%)	36.7%	40.3%
Two Parent Family (%)	82.0%	87.7%
Father's Occupation (% Professional)	60.7%	61.5%



Diagnostic Status

	CBIT	PST
Tic Disorder (%)		
Tourette Disorder	91.8	95.4
Chronic Motor Tic	6.6	4.6
Chronic Vocal Tic	1.6	0.0
Other Diagnoses (%)		
ADHD	32.8	20.0
OCD	13.1	24.6
Generalized Anxiety	16.4	23.1
Separation Anxiety	9.8	7.7
Social Anxiety	21.3	21.5
Other	14.8	12.3



Baseline Severity

YGTSS

	CBIT M (SD)	PST M (SD)
Total Motor	14.6 (4.4)	14.7 (3.1)
Total Phonic	10.1 (4.5)	10.0 (4.7)
Total Score	24.7 (6.23)	24.6 (6.0)
Impairment	25.0 (9.5)	23.4 (7.3)

Parent Tic Questionnaire (PTQ)

Total Motor	22.9 (13.1)	22.6 (13.4)
Total Phonic	12.0 (9.7)	13.2 (12.6)
Total Score	34.9 (18.9)	35.9 (22.4)

Study Attrition

	Total
Number of Participants Enrolled	126
Number of Active Participants	0
Number of Participants Completed Study	113
Number of Participants Early Terminated	13
Adverse Event	0
Investigator decision	0
Lost to follow-up	4
Subject choice	1
Talking about tics made subject uncomfortable	1
Study burden	
<i>Travel burden</i>	<i>3</i>
<i>Too great of a time commitment</i>	<i>1</i>
<i>Lack of improvement, burden</i>	<i>1</i>
<i>Study burden, needed treatment for symptoms other than tics</i>	<i>1</i>
<i>Worsening of tic symptoms</i>	<i>1</i>
Protocol Violation	0

10.3% attrition

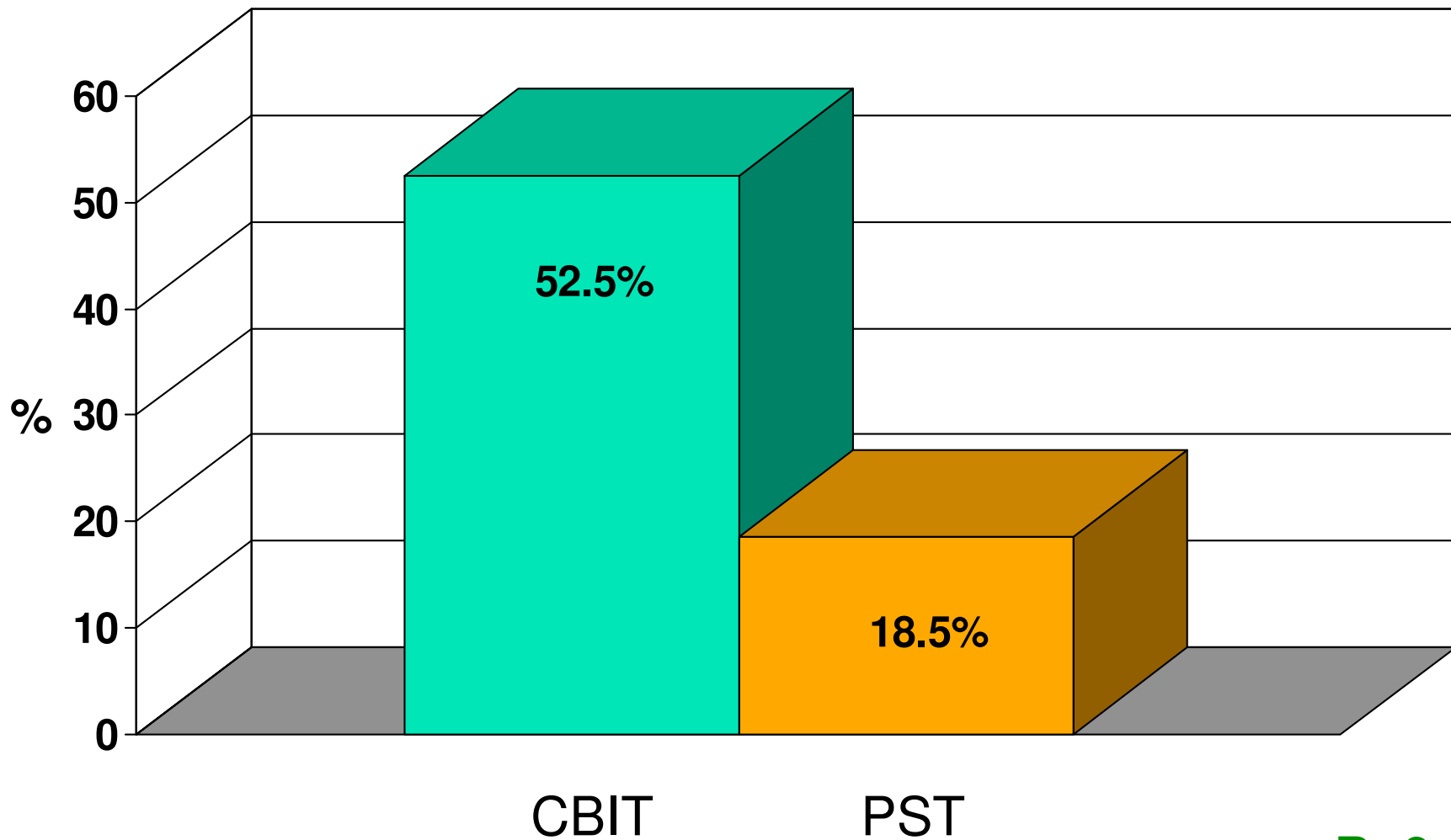


Treatment Compliance

	CBIT				PST				Overall Compliance*
	N Enrolled	# Actual visits	# Visits Expected	Compliance*	N Enrolled	# Actual visits	# Visits Expected	Compliance*	
Wisconsin	20	188	200	94.0%	20	184	200	92.0%	93.0%
Johns Hopkins	20	200	200	100.0%	21	190	210	90.5%	95.1%
UCLA	21	186	210	88.6%	24	233	240	97.1%	93.1%
OVERALL	61	574	610	94.1%	65	607	650	93.4%	93.7%

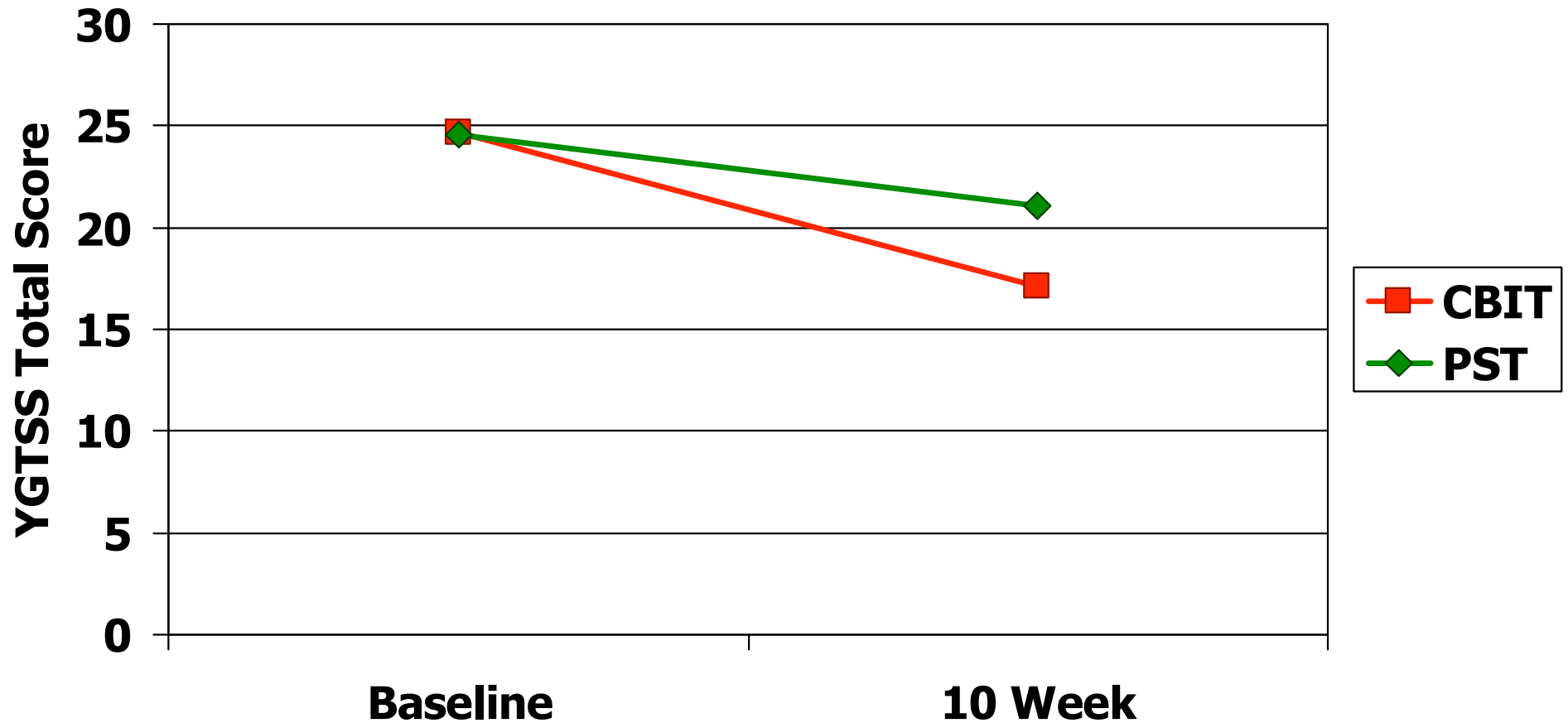
Responder Status at Week 10

(CGI-Improvement = 1 or 2)



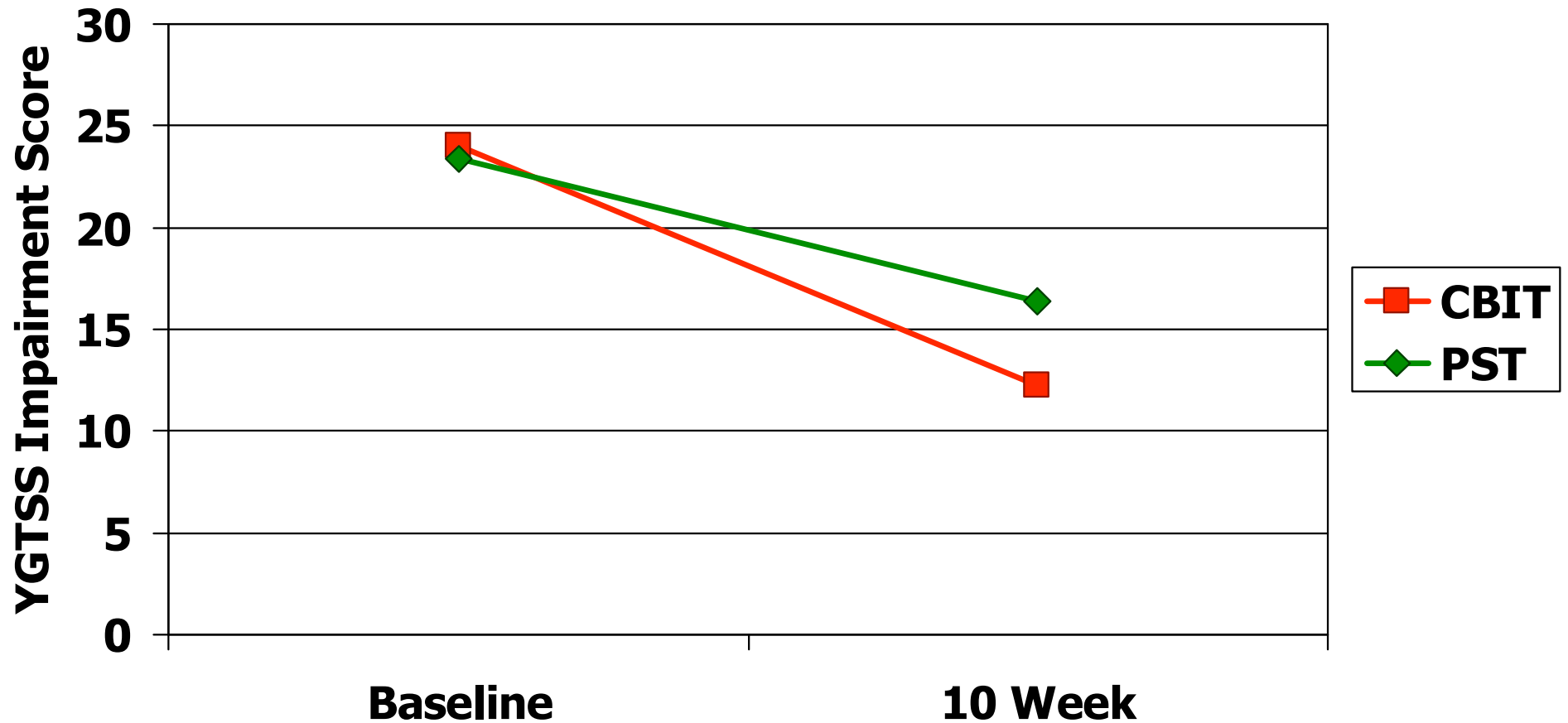
P<0.0001

YGTSS Total Tic Score



*CBIT < PST, $p < .01$; **31%** Reduction for CBIT Group; Effect Size $d = .68$

YGTSS Impairment Score

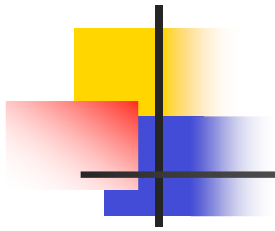


*CBIT < PST, $p < .01$; 49% Reduction for CBIT Group; Effect Size $d = .57$



Adverse Events by Treatment Group

	CBIT		Control		P-value
	N	(%)	N	(%)	
Upper Respiratory Infection	21	34.4	27	41.5	NS
Irritability, explosive behavior	10	16.4	10	15.4	NS
Headache	10	16.4	14	21.5	NS
Muscle or joint pain	9	14.8	13	20.0	NS
Accidental injury	7	11.5	19	29.2	0.02
Anxiety and nervousness	4	6.6	3	4.6	NS
Disruptive behavior	4	6.6	4	6.2	NS
Sore Throat	4	6.6	7	10.8	NS
Nausea, vomiting	2	3.3	5	7.7	NS
Stomach Discomfort	2	3.3	9	13.8	0.06
Dermatological problems	1	1.6	5	7.7	NS
Tic worsening	1	1.6	4	6.2	NS
Tiredness, fatigue	1	1.6	4	6.2	NS



Benchmarking CBIT Efficacy



Controlled Study of Risperidone in TS

Sample

- 34 subjects (26 children, 8 adults)
- Mean age (whole sample) 19.8 ± 17.01 years
- Age range = 6 to 62 years
- Mean age (children) 11.1 ± 2.20 years
- Age range = 6 to 16 years

Design

- Randomized, placebo-controlled, double-blind, parallel groups
- 8 weeks duration

Dose

- 1.5 to 3.5 mg/day in 2 divided doses

Scahill et al., 2003



Controlled Study of Ziprasidone in TS

Sample

- 28 subjects: 22 boys, 6 girls
- Age range= 7 to 17 years

Design

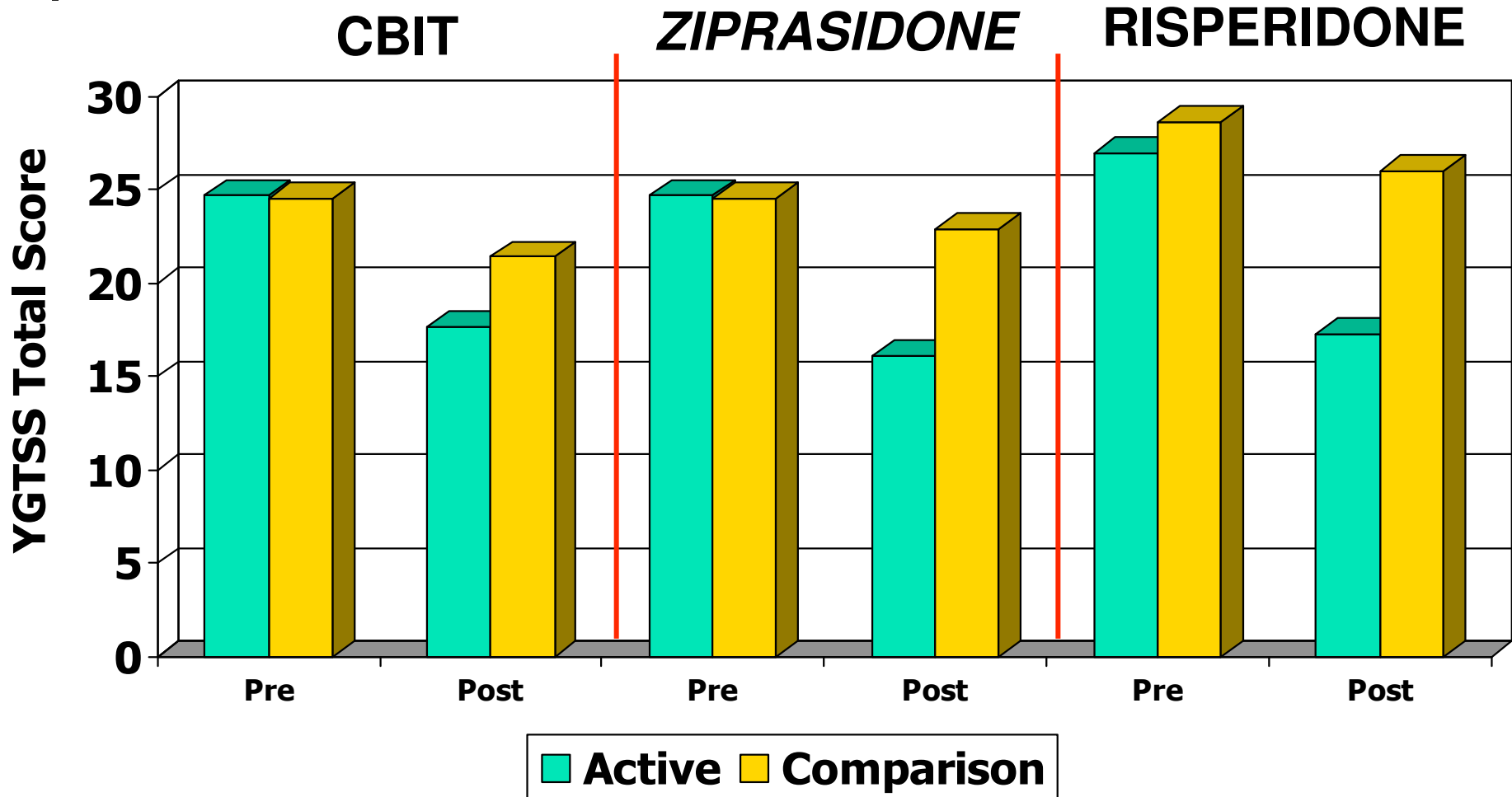
- Randomized, double-blind, placebo-controlled trial of parallel groups
- 8 weeks

Dose

- 5 to 40 mg/d

Sallee et al., 2000

Change in YGTSS Total Score



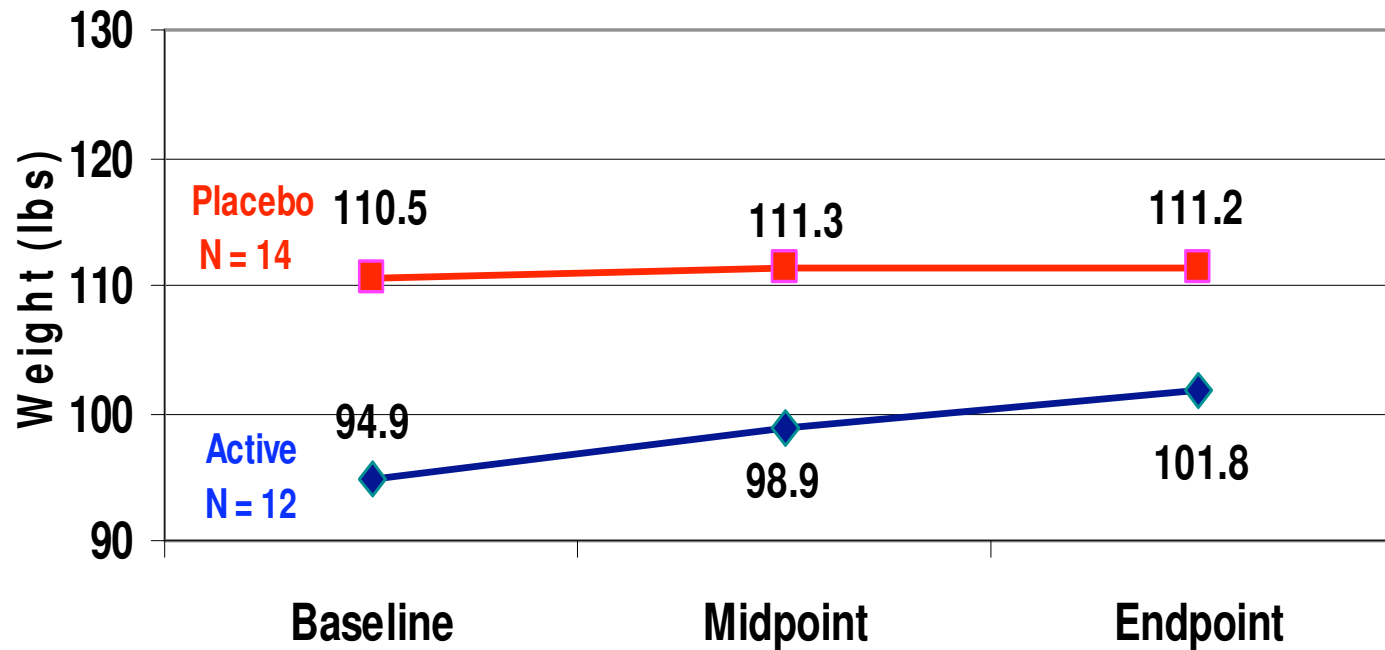


Benchmarking CBIT Efficacy

RCT	N	Comparison Group	YGTSS Total Score (%↓)		Effect Size (<i>d</i>)
			<u>Active</u>	<u>Comp</u>	
CBIT (Piacentini et al., submitted)	126	PST	31%	14%	0.7
Risperidone (Scahill et al., 2003)	34	PBO	36%	9%	1.0
Ziprasidone (Sallee et al., 2000)	28	PBO	35%	7%	0.9

Weight Gain - Risperidone

Risperidone Study - Children Only Average Weight



**Risperidone
associated
with Mean 7 lb
wt gain over 8
weeks**



Summary of CBIT Findings

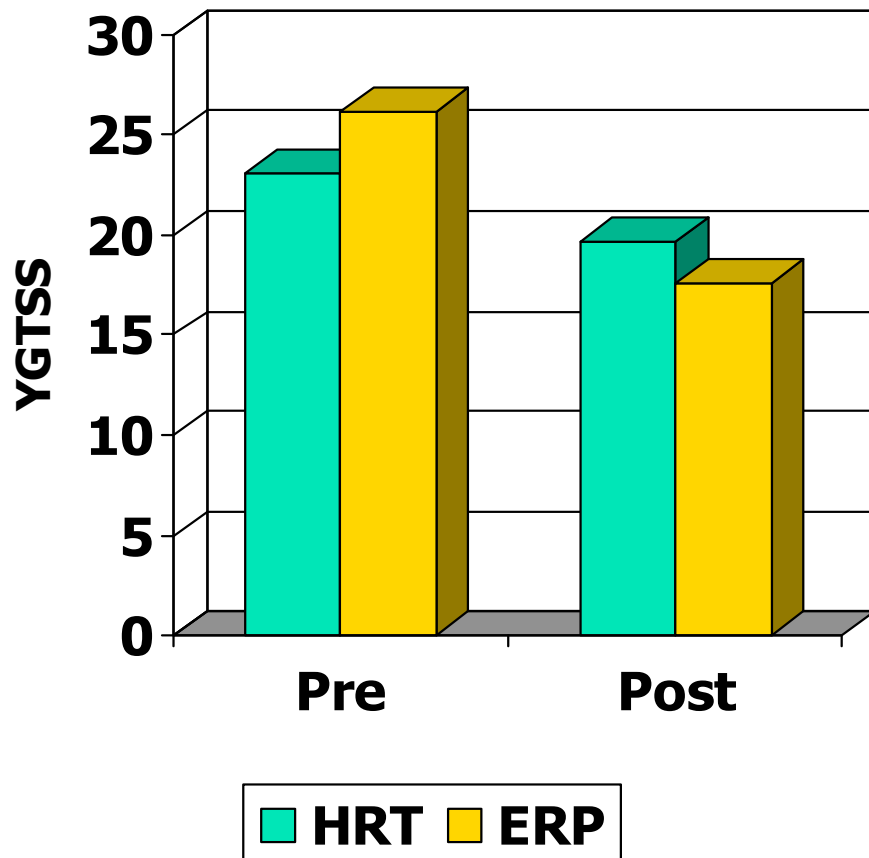
CBIT is more efficacious than PST for

- Reducing tic severity as measured by both clinician and parent report
- Reducing tic-related impairment

CBIT efficacy is roughly similar to that for the most-well studied psychopharmacological interventions

- Roughly similar symptom reduction rates
- Lower Effect Size perhaps related to use of active comparison group
- More favorably safety profile

Exposure plus Response Prevention



- 43 adults and children with TS randomly assigned to PST
- 10 sessions each, but ERP sessions had 2x as much therapy time
- 6 were noncompleters
- Both groups improved significantly
- The groups did not differ from each other
- Similar mechanism of action (e.g. disruption of negative reinforcement cycle)

(Verdellen et al., 2004; Behav Res Ther)



TS Treatment - Paradigm Shift?

Old - intuitive

- Ignore tics
- Tics can't be controlled
- Don't punish

- Don't try to suppress
- Tics get worse when you suppress
- Premonitory urge gets worse when you suppress
- New tics develop when you suppress

New - counterintuitive

- Become more aware
- Learn to manage tics
- Reward successful management

- Use behavioral strategies
- Tics don't get worse with behavioral treatment
- Premonitory urge will fade away

- New tics don't develop when you use behavioral strategies



New Advice to Parents

Old - intuitive

- Advocacy
- Support
- Comfort
- Protect
- Mindless
- Give time to tic
- Ignore tics
- Reduce stress
- Celebrate your specialness

New – counterintuitive

- Advocacy
- Challenge
- Comfort very carefully
- Expose
- Mindful
- Take time to manage
- Understand their ABCs
- Stress proof tic management skills
- Celebrate successes