Introduction to Behavioral Interventions for Tic Disorders

Presented by Benjamin Tucker and Elizabeth Grant

Outline

- Core and associated features of Tic Disorders
- Behavioral model and basic research
- State of evidence for behavioral interventions
- Behavioral Therapy How-to
- Q&A

Won’t be covering FND/FMD or Tourettic OCD

Core features

- ”Sudden, rapid, recurrent, nonrhythmic motor movement or vocalization” (DSM 5)
- Can be experienced as involuntary or something between voluntary and involuntary.
- Typical onset in early childhood (~3-5 years old), waxing/waning course, simple tics before complex tics, often start in the facial region later spreading to other regions.

Simple and Complex Tics

Simple: *Brief, single muscle group, less Purposeful*

Complex: *Less brief, multiple muscle groups, more purposeful*

Simple Motor Tics
Eye Blinking
Eye movements
Nose movements
Mouth movements
Facial grimace
Head jerks or movements
Shoulder shrugs
Arm movements
Hand movements
Abdominal tensing
Leg, foot, or toe movements

Complex Motor Tics

Combinations of simple tics
Writing Tics
Bending or gyrating
Rotating
Touching tapping, grooming, evening up)
Copropraxia (obscene gestures)

Stimulus-dependent tics
Self-injurious behavior
Echopraxia (copying another's gestures)

Simple Vocal Tics:
Sniffing
Throat clearning
Coughing
Sqeaking
Grunting
Single syllable sounds
Animal sounds

Complex Vocal Tics:
Words
Phrases
Combinations of multiple vocal tics
Disinhibited speech
Echolalia
Palilalia
Coprolalia

Tic Intensity

- Noticeability
- Volume
- Physical force
- Pain
- Injury

Diagnosis

Tourette's Disorder:

1. Both multiple motor and one or more vocal tics have been present at some time during the illness, although not necessarily concurrently.
2. The tics occur many times per day (usually in bouts) nearly everyday or intermittently throughout a period of more than 1 year, and during this period, there was never a tic-free period of more than 3 consecutive months.
3. The onset is before 18 years old.
4. The disturbance is not due to the direct physiological effects of a substance (stimulants) or a general medical condition (Huntington's disease or postviral encephalitis)

Diagnosis

Chronic Tic Disorder:

1. Single or multiple motor and/or vocal tics.
2. The tics occur many times per day, nearly everyday or intermittently throughout a period of more than 1 year, and during this period, there was never a tic-free period of more than 3 consecutive months.
3. The onset is before 18 years old.
4. The disturbance is not due to the direct physiological effects of a substance (stimulants) or a general medical condition (Huntington's disease or postviral encephalitis)
5. Criteria have never been met for Tourette's disorder or chronic motor or vocal tic disorder.

Diagnosis

Transient Tic Disorder:

1. Single or multiple motor and/or vocal tics.
2. The tics occur many times per day, nearly everyday for at least 4 weeks, but for no longer than 12 consecutive months.
3. The onset is before 18 years old.
4. The disturbance is not due to the direct physiological effects of a substance (stimulants) or a general medical condition (Huntington's disease or postviral encephalitis)
5. Criteria have never been met for Tourette's disorder or chronic motor or vocal tic disorder.

Associated features

- More common in males than females
- Associated with OCD (~30%) and ADHD (~50%)
- Development of premonitory urges
- Variable course (some cases developmental, others chronic)
- Variable level of impact

Mechanisms in tics

Neural:

- Abnormal signaling in subcortical regions and disinhibition in cortical regions expressed as tics
- Cortico-Striato-Thalamo-Cortical (CSTC) circuits
- Dopaminergic system

Behavioral:

- Habit learning
- Negative Reinforcement:
  - Premonitory urge↠Tic↠Reduced premonitory urge
- To some extent positive reinforcement
- Contextual factors (internal and external)

Contextual factors, patient report

Exacerbates tics

- Stress and anxiety
- Fatigue
- Socializing
- Being alone
- Returning home from school
- Passive attention activities
- Waiting
- Watching TV
- Overstimulation

Attenuates tics

- Relaxed
- Concentrated
- Socializing
- Doctor visits
- Being with friends
- Passive attention activities
- Reading
- Physical exercise

See Conelea and Woods (2008)

Contextual factors, experimental functional analyses

Exacerbates tics

- Presence of an individual
- Tic-related talk
- Contingent attention
- Contingent escape
- Reading tasks
- Overt observation

Attenuates tics

- Reinforcement for tic-free periods
  - Tangible
  - Social
  - Escape
- Overt observation

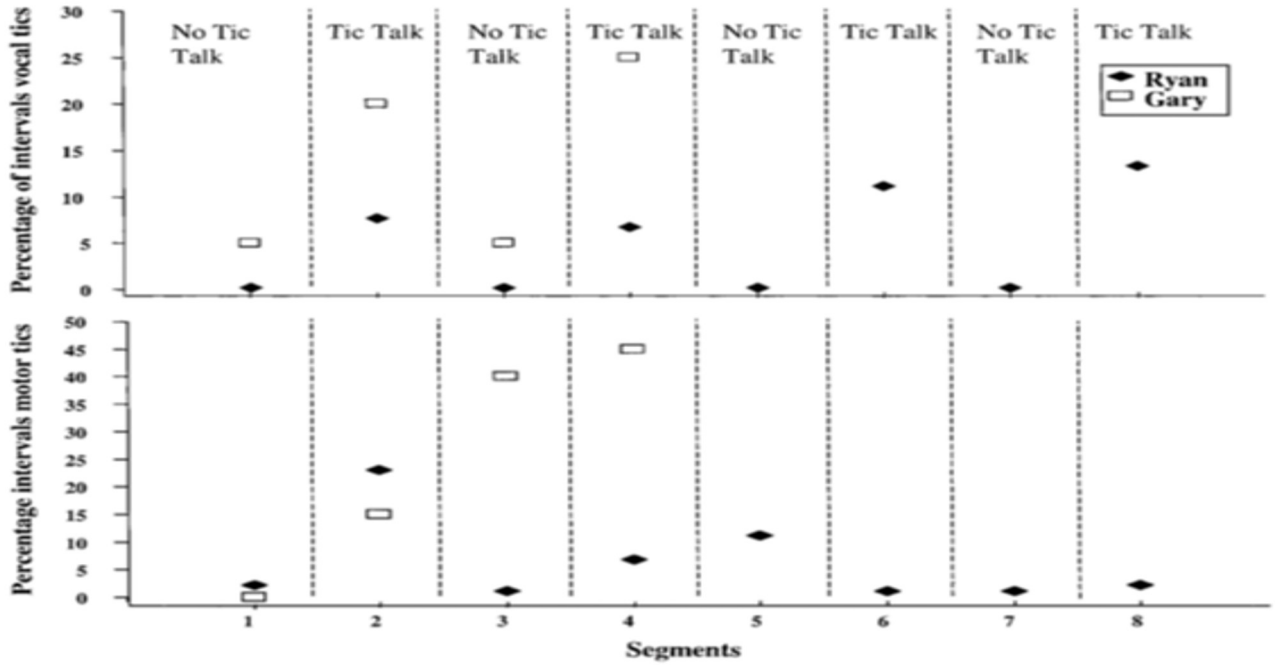


Figure 1. Percentage of intervals with vocal and motor tics across 5- to 7-min observational segments recorded under tic-talk and no-tic-talk conditions for Ryan and Gary.

Woods, et al. (2001)

Tic Suppression

- Casual report and observation that tics can be suppressed
- Effect of positive reinforcement (Differential Reinforcement of Other Behaviors; DRO) on tics
- Relationship between tic suppression and premonitory urges
- Debunking post-suppression rebound hypothesis

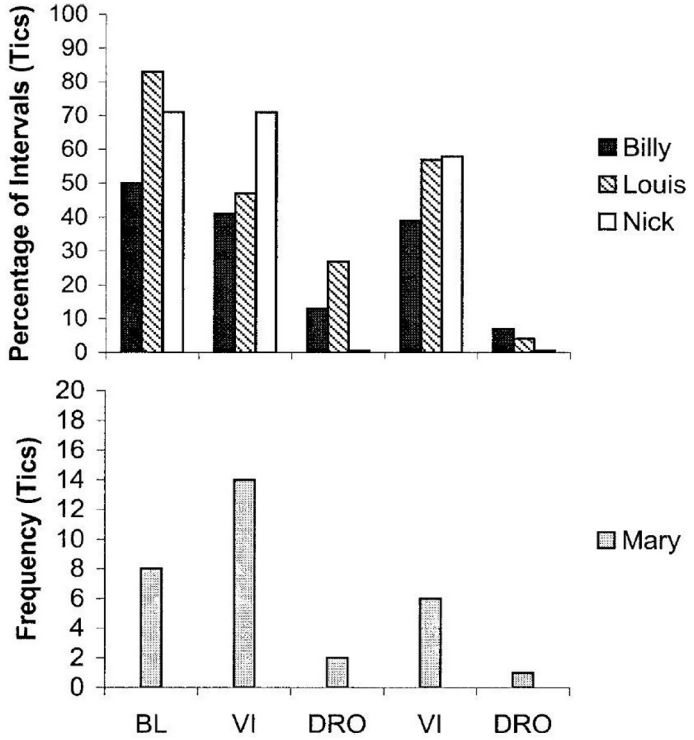
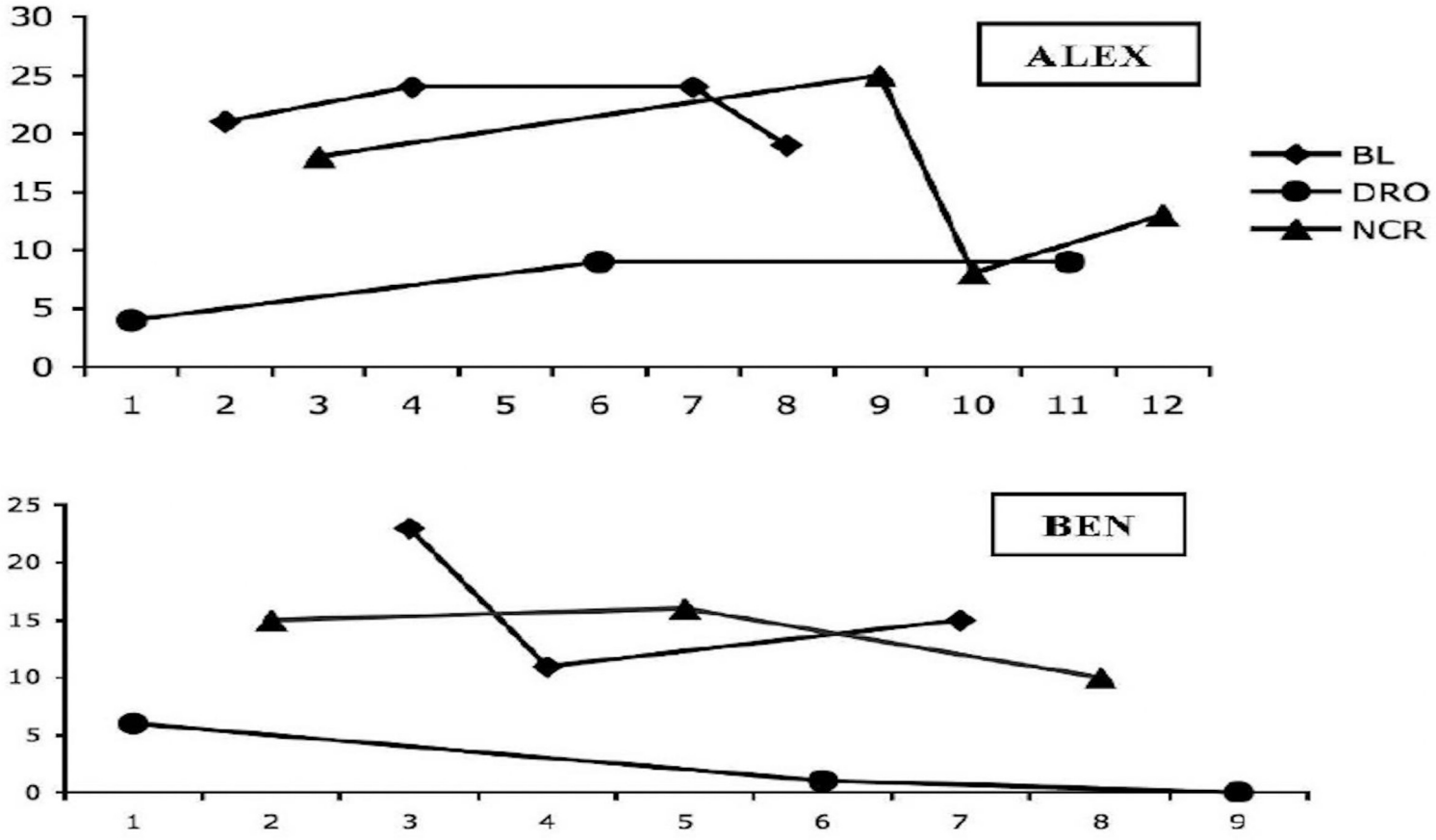


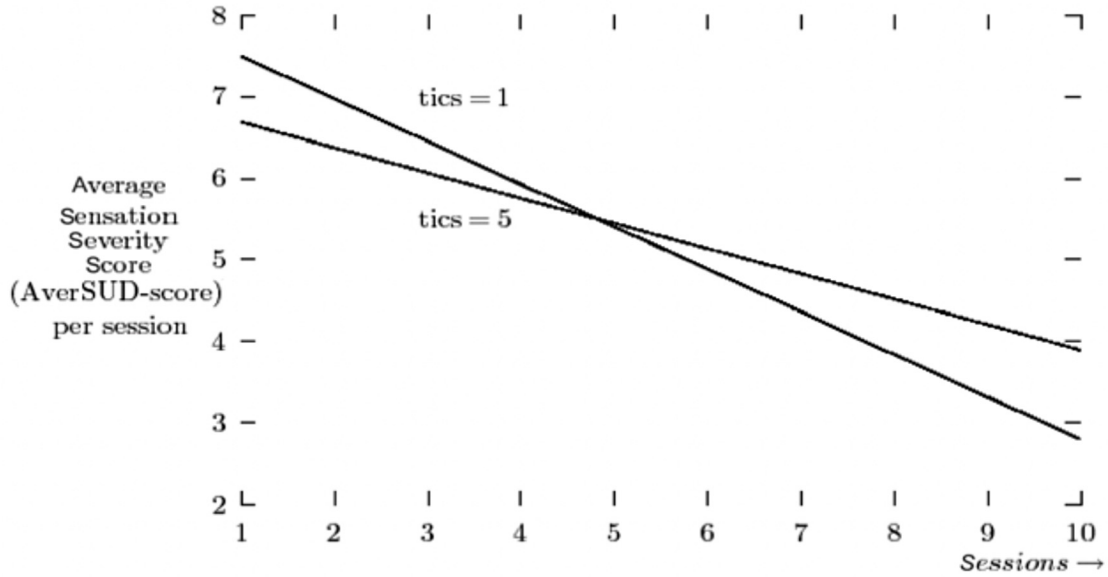
Figure 1. The top panel shows the percentage of 10-s intervals with tics across baseline (BL), verbal instruction (VI), and DRO-enhanced instruction (DRO) conditions for Billy, Louis, and Nick. The bottom panel shows the frequency of tics across each condition for Mary.

Woods & Himle (2004)



Himle, Woods, & Bunaciu (2008)

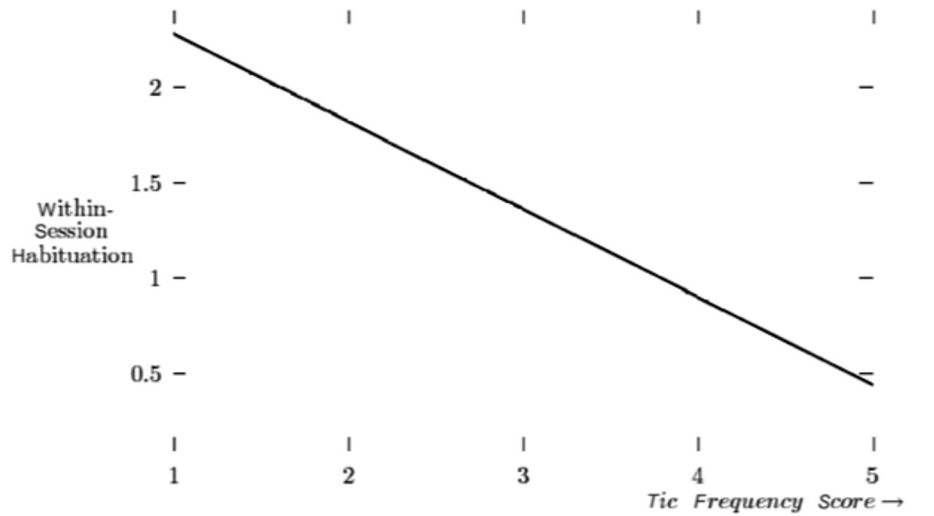
Figure 2
Graphic Representation of the Between-Session Habituation and Its Interaction With Tics



Note: Reduction of the average of the nine total sensation severity scores within a session (AverSUD-scores) across sessions for patients exhibiting no tics (tics = 1) and for patients exhibiting ≥25 tics (tics = 5).

Verdellen, et al. (2008)

Figure 3
Graphic Representation of the Within-Session Habituation and Its Interaction With Tics



Note: The smaller the tic frequency score, the larger the within-session habituation (patients with a tic frequency score = 1, i.e., no tics exhibited during sessions, showed a SUD-score reduction of 2.4). The larger the tic frequency score, the smaller the within-session habituation (patients with a tic frequency score = 5, i.e., ≥25 tics exhibited during sessions, showed a SUD-score reduction of 0.4). SUD-score = total sensation severity score.

Verdellen, et al. (2008)

Behavior Therapy Myths

Tic Suppression Strategies will backfire

- Data shows post-suppression rebound is rare.

Treating one tic will make untreated tics worse.

- Research indicates people may see no difference in untreated tics and in some cases improvement.

Behavior therapy replaces an old tic with a new tic.

- Current research has not noted this in the literature.

Paying more attention to tics will make them worse

- Data from current research does not support increasing attention on tics ***in the context of therapy*** has any detrimental effect. Parents are generally taught to ignore tics and instead attend to how well the child is doing their therapeutic exercises.

Habit Reversal Training (Azrin and Nunn, 1973)

- Based on over-correction procedures in Applied Behavior Analysis (ABA)
- 1) Awareness training, 2) Competing response training, 3) Social and motivational support
- Over a dozen single-subject experimental demonstrations of effectiveness
- In group trials, superior to supportive psychotherapy (Wilhelm, et al 2003; Deckersbach et al, 2006), massed negative practice (Azrin, Nunn, and Frantz, 1980)

Function-based interventions

- Interventions for tics based on an individualized functional assessment.
- Antecedent and Consequences associated with tics
- Minimizes exposure to contexts that exacerbate tics
- Arranges for the removal of social reinforcement for tics
- Evidence base from single-subject experimental applications

Comprehensive Behavioral Interventions for Tics (CBIT; Woods, et al., 2008)

- CBIT = HRT plus function-based interventions
- Large multi-site RCTs demonstrate superior to psychoeducation supportive psychotherapy in children (Piacentini, et al, 2010) and adults (Wilhem, et al, 2012)
- Gains maintained at long-term follow-up (Espil, et al., 2022)
- Effectiveness doesn't appear to be influenced by co-morbities or medication status (Sukhodolsky, et al., 2017)
- Effective when delivered over telehealth (Himle, et al., 2010; Himle, et al., 2012)
- Online self-guided applications (tic helper)
- Best Practices recommend CBIT as first line treatment for tic disorders over medications.

Exposure and Response Prevention (Verdellen et al, 2004)

- Teaches suppression of ALL tics at once rather than individually.
- Timed tic suppression trials (attempting to increase duration)
- Adds imaginal/covert/in-vivo exposure to premonitory urges or urge-creating contexts
- Targets habituation to premonitory urges over 1-to-2 hour ERP sessions
- RCT showed ERP to be AT LEAST as effective as HRT alone.

Behavior Therapy How-To

Flexibility in Implementation of the Treatment Manual

The CBIT manual has an 11 session design but flexibility is needed.

Additional sessions may be necessary for a difficult tic or to return to a tic that has already been addressed.

If a person has a large number of tics, or if the data show that therapeutic gains have not been maximized, this may also warrant additional sessions.

Behavior Interventions

Comprehensive Behavioral Intervention for Tics (CBIT)
Habit response training (HRT)
Relaxation training
Function-based treatments

The goal of CBIT is to teach effective tic management skills rather than “cure” the tic disorder.

Psychoeducation for Tics

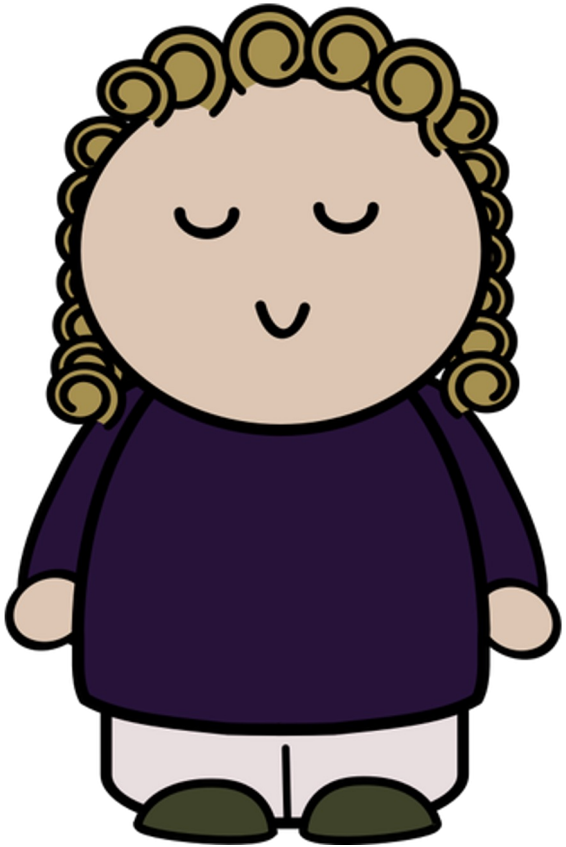
Psychoeducation about Tic Disorders

The goal of psychoeducation is to reduce blame, stigma, and negative feelings related to the person's symptoms.

Psychoeducation gives a metaphor or framework for understanding tics.

We use metaphors such as:

- Brain hiccups
- Break system in the brain needs a tune up
- Mosquito bites



Recommended progress measures and assessment

- Yale Global Tic Severity Scales (YGTSS): Semi-structured Clinician administered
- Parent Tic Questionnaire (PTQ): self-report
- Adult Tic Questionnaire (ATQ): self-report
- Premonitory Urge Scale for Tics (PUTS): self-report
- Direct measures: tics over 10 minute period

Function-Based Intervention

Principles of

Function-Based Intervention

The purpose of function-based interventions is to isolate the factors that make tics worse for the patient and modify those factors to bring about tic reduction and decreased impairment.

Factors that make tics worse or lead to poorer functional outcomes can be categorized into antecedents and consequences.

Describing the Tic and Antecedent Sensations and Behaviors

The person should describe their tics in immense detail. Often, this will mean looking at exactly which muscles are moving and/or how the patient's limbs move to perform the tic.

We want the person to be able to recognize the antecedent sensations and behaviors that operate as a warning that a tic is about to occur.

Sometimes children struggle with recognizing these signs and in that case it may be helpful to give a few examples.

Antecedents and Consequences: Functional Assessment

Antecedents

Internal and external events that happen right before the tic.

Internal Examples: anxiety, anticipation, excitement, anger.

External examples: particular settings, certain classes, watching television or playing video games, the presence of particular people.

Consequences

Events that occur immediately following tics.

Examples: a child being asked to leave a situation, social reactions such as teasing or comforting.

Premonitory Urge

These are the signals that a tic is coming.

Examples include tensing in areas where the tic is performed, sensations that bring about the tic.

They are things the person does or feels that signal tics or act as “warning signs.”

Can last for a minute or longer.

You will want to encourage the person to rate their urge on a 1-10 scale, 1 being that the urge is low, 10 being the urge to tic is high, to help them begin to notice that the strength of the premonitory urges decreases over time.

Describing the Tic and Antecedent Sensations and Behaviors

Common areas for Premonitory Urges

Left palm

Right shoulder blade

Right palm

Left shoulder

Left shoulder blade

Midline abdomen

Throat

Right shoulder

Back of right hand

Front of right thigh

Front of right foot

Back of left hand

Inside of right upper arm

Front left thigh

Left eye

Right eye

Antecedents and Consequences: Functional Intervention

Antecedents

Classroom tics

After school tics

Public places other than school

Watching TV or playing video games

Tics while playing sports

During meals

Bedtime tics

In-car tics

Consequence Interventions

If social attention is endorsed

If escape items are endorsed

Reminding the person to use their competing responses

Providing opportunities to practice tic management strategies

Relaxation training

Exposure and Response Prevention

Educating those around the person and providing specific instructions on how to react appropriately

Habit Reversal Training

Social Support

Habit reversal training (HRT) requires a lot of hard work and consistency.

Parent participation is key!

How does the child want to be reminded to complete homework/exercises?

Having a reward system to reward practice rather than tics.

It is important to teach parents not to overreact to tics.

Empower the parent to participate in session as well as homework practice.

Creating a Tic Hierarchy

When you begin, you will want to list out all of the tics the person and their loved ones have noticed starting from the top of the head and going all the way down to the bottom of their feet.

Once you have generated this list of all tics, you will need to get an idea of what each tic looks like, what the antecedents and consequences are, where they occur the most, and how much disruption they cause in day-to-day life.

Functional Assessment Form (FAF)—Child Version

Patient: _____ Date completed: _____

Tic (From Hierarchy)									
ANTECEDENTS									
Classroom									
At Home After School									
Public Place Other Than School									
Watching TV/Video Games									
Playing Sports									
During Meals									
Bedtime									
Doing Homework									
In Car									
Other Anxiety -Thoughts about people judging him									
Other_____									
Other_____									
CONSEQUENCES									
Parent Tells Child to Stop Tics									
Teacher/Other Adult Tells Child To Stop									
Peer/Sibling Tells Child to Stop									
Parent/Teacher/Sibling Comforts Child									
Someone Laughs at or With the Child									
Child is Asked to Leave the Area									
Child Doesn't Complete Meal, Homework, or School Task									
Child Gets to Stay up Later									
Child Doesn't Have to do Chores or Other Required Activity									
Other_____									
Other_____									
Other_____									

Awareness Training

When teaching awareness training, the goal is for the person to acknowledge when tics happen and/or are about to happen.

Competing Response (CR) training cannot begin until the person has achieved consistent awareness for the tic.

If the person is not aware of the tic or premonitory urges (if present), the rest of the procedure will be ineffective.

Ideally, the person will be able to describe the environmental cues and antecedent sensations as well as the exact behaviors performed during their tic.

Competing Response Training

The Competing Response (CR) is a behavior the person can engage in when the urge to tic appears or soon after it starts. It is essential that it is implemented as soon as the premonitory urge or tic occurs. The CR should be held for either one minute or until the premonitory urge fades away, whichever is longer.

Selecting the CR
-Should be physically incompatible with the tic.
-Should be maintained for at least 1 minute or until the premonitory urge goes away.
-Should be socially inconspicuous and compatible with normal, ongoing activities.
-Should include feedback from the person about what works best.

Demonstrating the CR and its correct implementation

Describe the CR to the person and make sure to include their feedback that it is **acceptable**. This will help with treatment compliance.

Demonstrate the CR for the person while still conversing with them to show that life and social interaction can continue.

Ask them to try and provide feedback until the client can do the CR correctly.

Begin to practice the CR in response to the client's pretend or actual premonitory urge or tic for 1 minute or until the urge goes away. Offer praise.

Practicing the correct implementation of the CR with actual occurrences of the tic.

Examples of Tics and their Competing Responses

TIC	***Competing Response***
Body jerk	Tighten stomach and buttock muscles
Evening out	Hold arms at side
Eye Blinking	Controlled, voluntary eye blinks
Knuckle Cracking	Cross arms and/or fold hands
Shaking head	Tense neck muscles, lower chin, deep breathe
Vocal tics	Controlled breathing considering inhalation/exhalation pattern

Habit Reversal Training for First Tic and Homework

- Introduce the tic
- Describe antecedent sensations and behaviors
- Acknowledge tics and tic signals
- Select the CR
- Teach the patient how to do the CR

The parent (or social support person) will be trained in this session.

Identify the support person and describe the purpose of social support

Teach the parent to praise the person for doing HRT correctly

Teach the parent to prompt the person to do HRT when needed

Homework

Homework is assigned following every session and a homework check in should be completed at the beginning of every session.

Homework is typically parent-assisted with children and often includes self-monitoring assignments, competing response practice, and function-based interventions.

Homework compliance is extremely important in this intervention for additional practice, generalization, and maintenance.

Self-Monitoring Training

You will want to ask the person and loved ones to download a habit tracking app or keep tally marks on paper or in a notebook to track competing responses as well as occurrences of the tic.

You and the client will work together to choose the first tic to monitor in session based on interference in their life as well difficulty to practice using the CR.

You will want the person and their support people to monitor the tic and CRs a minimum of 3-4 times throughout the week for a minimum duration of 15-30 minutes.

Homework Review

During the homework review, you should review the events of the week as well as their data from practicing. Revise the hierarchy as needed.

Ask about any significant events in the person's life, their symptoms and the impact on school, social, and family functioning, and at least one positive thing from the person that occurred since last meeting.

Review how inconvenient tics are and what they dislike about their tics. Create a list of reasons why tics are inconvenient, embarrassing, distressing, and/or annoying.

Relaxation Techniques and Diaphragmatic Breathing Exercises

Tics make muscles tense and leave the whole body tight and tense. This can cause people with tics to feel upset or tired.

Relaxation uses two skills: relaxed breathing and muscle relaxation.

Diaphragmatic breathing requires taking breaths in through the nose and out through the mouth. The stomach should expand and contract visibly.

It is helpful to tell the person to imagine laying on their back with a balloon on their stomach and they have to make the balloon go up and down without using their hands. You can demonstrate by putting a hand on your stomach and letting them see your hand move out when you breathe in and in when you breathe out.

Progressive Muscle Relaxation

To teach this exercise, you first need the pt to know what tensing their muscles feels like.

Teach them in groups: 1. arms and hands. 2. legs, buttocks, and feet. 3. chest and stomach. 4. face, neck, and shoulders.

After they are able to tighten all of their muscles, walk the person through tensing and relaxing each muscle group twice. Tensing should be 5-7 seconds and relaxing should be about 20 seconds.

Remind the person to practice diaphragmatic breathing while doing the exercise.

Relapse Prevention Strategies for Monitoring and Developing CR for New Tics

Review with the family that the child's condition is chronic, symptoms may return or become exacerbated during high stress times, and that the child's repertoire might change frequently over time, as specific tics wax and wane.

Parents should be vigilant for tic reappearance or exacerbation during stressful periods.

The person does not need to be overprotected from stress.

The family should support the person to engage in stress management techniques they find effective

Family should be aware of triggers that can lead to symptom exacerbation.

Resources

Managing Tourette Syndrome (CBIT manual)

BT Coach (mobile app for self-monitoring and ERP practice)

Tic Helper (online self-guided behavior therapy for tics)

“Tics” Therapist Manual (ERP manual)

Tourette Association of America

- Upcoming research (free CBIT training!) https://tourette.org/cbit-nih-study

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Questions?