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Benchmarking Treatment Response in Tourette's Disorder: A Psychometric Evaluation and Signal Detection Analysis of the Parent Tic Questionnaire

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This study assessed the psychometric properties of a parent-reported tic severity measure, the Parent Tic Questionnaire (PTQ), and used the scale to establish guidelines for delineating clinically significant tic treatment response. Participants were 126 children ages 9 to 17 who participated in a randomized controlled trial of Comprehensive Behavioral Intervention for Tics (CBIT). Tic severity was assessed using the Yale Global Tic Severity Scale (YGTSS), Hopkins Motor/Vocal Tic Scale (HMVTS) and PTQ; positive

treatment response was defined by a score of 1 (*very much improved*) or 2 (*much improved*) on the Clinical Global Impressions – Improvement (CGI-I) scale. Cronbach's alpha and intraclass correlations (ICC) assessed internal consistency and test-retest reliability, with correlations evaluating validity. Receiver- and Quality-Receiver Operating Characteristic analyses assessed the efficiency of percent and raw-reduction cutoffs associated with positive treatment response. The PTQ demonstrated good internal consistency (α = 0.80 to 0.86), excellent test-retest reliability (ICC = .84 to .89), good convergent validity with the YGTSS and HM/VTS, and good discriminant validity from hyperactive, obsessive-compulsive, and externalizing (i.e., aggression and rule-breaking) symptoms. A 55% reduction and 10-point decrease in PTQ Total score were optimal for defining positive treatment response. Findings help standardize tic assessment and provide clinicians with greater clarity in determining clinically meaningful tic symptom change during treatment.

Keywords: Tourette's disorder; psychometrics; receiver operating characteristic

Chronic tic disorders (CTDs), including Tourette's disorder (TD), are characterized by involuntary, repetitive movements (i.e., motor tics) and/or vocalizations (i.e., vocal tics) that have persisted for more than 1 year (American Psychiatric Association [APA], 2013). Tics generally first emerge in early childhood, peaking in severity in early adolescence, and, in many cases, steadily declining through early adulthood (Hallett, 2015). Among youth, CTDs are more common in males, with a ratio as high as 4:1 (Hallett, 2015; Robertson, 2012), and are prevalent at rates ranging from 0.4% to 3.8% (Knight et al., 2012; Scahill, Specht, & Page, 2013). In addition to tics, youth with CTDs commonly present with attention-deficit/hyperactivity disorder (ADHD) and obsessive- compulsive disorder (OCD; Cavanna & Rickards, 2013). Although CTDs are often associated with diminished quality of life (Cavanna et al., 2013), behavioral and pharmacological interventions have both demonstrated efficacy in reducing tic severity (Murphy, Lewin, Storch, & Stock, 2013; Piacentini et al., 2010).

In clinical research, tics are most commonly assessed using the Yale Global Tic Severity Scale (YGTSS; Leckman et al., 1989). The YGTSS is a clinician-rated interview measure of tic severity that takes 30 to 45 minutes to complete. Available evidence suggests a reduction of 25% to 35% or decrease of 6 to 7 points on the YGTSS is associated with positive treatment response to empirically supported interventions among children and adults with CTDs (Jeon et al., 2013; Storch et al., 2011). Although informative, the YGTSS is less commonly used in clinical practice as it requires administration by a trained rater and may be time consuming (Chang, Himle, Tucker, Woods, & Piacentini, 2009). Indeed, clinician-rated measures are less favored in clinical practice due to the time burden (Boswell, Kraus, Miller, & Lambert, 2015; Hatfield & Ogles, 2007) of administration, scoring, and interpretation (Garland, Kruse, & Aarons, 2003).

A time-efficient alternative to clinician ratings of tic severity are parent and self-report rating scales. These scales can be completed quickly in the waiting room prior to treatment visits. Although there are several options for parent and/or self-report rating scales (see McGuire et al. 2012 for a review), most have noted limitations that constrain their use in either research or clinical practice (e.g., minimal psychometric evaluation, lack of specificity to tic symptoms, absence of individual tic ratings, etc.). One promising parent-report measure of tic severity is the Parent Tic Questionnaire (PTQ; Chang et al., 2009). The PTQ assesses tic severity in the past week, allowing for individual parent ratings of tic presence or absence for 14 vocal tics and 14 motor tics. Additionally, the measure allows for separate ratings of tic frequency and intensity, completed for each tic. Frequency ratings range from 1 to 4 with the following anchors: weekly, daily, constantly, hourly. Intensity ratings range from 1 to 4, with higher scores indicative of greater tic intensity. The frequency and intensity ratings can be summed to yield a severity score ranging from 0 (i.e., tic is absent, thus no frequency or intensity ratings are given) to 8 for each tic. The PTQ includes subtotals for motor and vocal tic severity, which are summed to produce a total tic score. In the only prior psychometric evaluation (Chang et al., 2009), the PTQ exhibited fair to excellent internal consistency (α = .79 to .90), good to excellent 2-week test-retest reliability (Interclass correlation coefficient; ICC = .72 to .84), strong convergent validity with other measures of tic severity (r = .54 to .73), and discriminant validity, with correlations between the PTQ and YGTSS remaining strong after controlling for symptoms of inattention (rs = .53 to .70) and OCD (rs = .45 to .66).

Although providing initial evidence for using the PTQ, this initial report had some limitations, including a relatively small sample size (n = 40) and limited attention to discriminant validity of the PTQ. The latter point is particularly important due to the common presence of co-occurring psychiatric conditions (e.g., OCD, ADHD, disruptive behavior) among youth with tic disorders. It is important to ensure the PTQ distinguishes between tics and potentially co-occurring behaviors (e.g., compulsions, hyperactivity, aggression) that are distinct from tics but may appear similar in topography