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ARTICLE

A multicenter examination and strategic revisions of the Yale Global Tic Severity Scale

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Abstract

Objective

To examine the internal consistency and distribution of the Yale Global Tic Severity Scale (YGTSS) scores to inform modification of the measure.

Methods

This cross-sectional study included 617 participants with a tic disorder (516 children and 101 adults), who completed an age-appropriate diagnostic interview and the YGTSS to evaluate tic symptom severity. The distributions of scores on YGTSS dimensions were evaluated for normality and skewness. For dimensions that were skewed across motor and phonic tics, a modified Delphi consensus process was used to revise selected anchor points.

Results

Children and adults had similar clinical characteristics, including tic symptom severity. All participants were examined together. Strong internal consistency was identified for the YGTSS Motor Tic score ($\alpha = 0.80$), YGTSS Phonic Tic score ($\alpha = 0.87$), and YGTSS Total Tic score ($\alpha = 0.82$). The YGTSS Total Tic and Impairment scores exhibited relatively normal distributions. Several subscales and individual item scales departed from a normal distribution. Higher scores were more often used on the Motor Tic Number, Frequency, and Intensity dimensions and the Phonic Tic Frequency dimension. By contrast, lower scores were more often used on Motor Tic Complexity and Interference, and Phonic Tic Number, Intensity, Complexity, and Interference.

Conclusions

The YGTSS exhibits good internal consistency across children and adults. The parallel findings across Motor and Phonic Frequency, Complexity, and Interference dimensions prompted minor revisions to the anchor point description to promote use of the full range of scores in each dimension. Specific minor revisions to the YGTSS Phonic Tic Symptom Checklist were also proposed.

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Glossary

ADHD = attention-deficit/hyperactivity disorder; **ADIS-C/P** = Anxiety Disorder Interview Schedule–Parent and Child Version; **DSM-IV** = *Diagnostic and Statistical Manual of Mental Disorders, 4th edition*; **K-SADS** = Kiddie-Schedule for Affective Disorders; **MINI-KID** = Mini International Neuropsychiatric Interview-KID; **OCD** = obsessive-compulsive disorder; **RCT** = randomized clinical trial; **SCID** = Structured Clinical Interview for DSM-IV; **TD** = Tourette disorder; **YGTSS** = Yale Global Tic Severity Scale; **YGTSS-R** = Yale Global Tic Severity Scale–Revised.

Empirically supported interventions for Tourette disorder (TD) have been established in randomized clinical trials (RCTs). Entry criteria in RCTs and treatment guidelines rely on accurate assessment of tic severity for participant selection and empirically supported treatment recommendations.[1–3] Thus, optimal precision in measuring tic severity is essential for clinical care and research. The Yale Global Tic Severity Scale (YGTSS) is a multidimensional, clinician-rated scale that measures tic severity[4] and is commonly used as a primary outcome measure in RCTs.[5–7,17] There have been 5 published psychometric evaluations of the YGTSS.[4,8–11] These studies have shown that the YGTSS Total Tic score has excellent internal consistency (α = 0.93–0.99),[8,12] excellent interrater reliability (intraclass correlations = 0.84–0.95),[4,12] and good test–retest reliability.[8] The YGTSS Total Tic score has also demonstrated good convergent validity[4,8] and discriminant validity from measures of anxiety, depression, attention-deficit/hyperactivity disorder (ADHD) severity, and obsessive-compulsive disorder (OCD) (r = 0.01–0.36).[4,8] Finally, the motor and vocal, 2-factor structure has been supported in all 5 studies.[4,8,10–12]

Despite their strengths, these prior reports have been relatively small, single-site studies, which limits the generalization of the findings. Moreover, the small sample sizes do not allow detailed examination of the scale dimensions. This report examines the internal consistency and distribution of YGTSS component scores and dimensions in a large, multisite sample of children and adults. Based on these findings, strategic revisions are offered designed to increase the precision of the YGTSS.

Methods

Participants

Participants included 617 individuals diagnosed with a DSM-IV tic disorder (552 Tourette syndrome, 46 chronic motor tic disorder, 5 chronic vocal tic disorder, and 14 transient tic disorder) that were recruited from 7 US academic TD and OCD specialty clinics. Participants were ascertained in routine clinical care or via participation in a clinical trial (University of California Los Angeles, n = 181; University of South Florida, n = 207; University of Wisconsin–Milwaukee, n = 66; Massachusetts General Hospital and Harvard Medical School, n = 47; John Hopkins University, n = 41; University of Texas Health Science Center at San Antonio, n = 40; Yale Child Study Center, n = 35).[5,6,13–19] The sample was predominantly male and Caucasian (see table 1 for demographic and clinical characteristics). The average age of participants was 15 ± 10 years (range 5–69). Co-occurring psychiatric conditions were common, with 64% of participants meeting diagnostic criteria for one or more of the following disorders: ADHD, OCD, non-OCD anxiety disorders, and depressive disorders.

Measures

Psychiatric diagnoses

Psychiatric diagnoses were determined by an experienced multidisciplinary team at each site (e.g., child psychiatrist, psychologist, psychiatric nurse practitioner). In 410 (66.4%) cases, the clinical assessment was supported by an age-appropriate structured diagnostic interview administered by a trained clinician (i.e., Anxiety Disorder Interview Schedule–Parent and Child Version [ADIS-C/P],[20,21] n = 157; the Structured Clinical Interview for DSM-IV [SCID],[22] n = 122; Kiddie-Schedule for Affective Disorders [K-SADS], n = 106; Mini International Neuropsychiatric Interview-KID [MINI-KID],[23] n = 25). In the remaining 207 cases, 2 doctoral-level psychologists or child psychiatrists applied a best estimate procedure to establish consensus on diagnoses using all available information.[24]

Yale Global Tic Severity Scale

The YGTSS is a clinician-rated measure of tic severity over the last 7–10 days that has a stable factor structure[9] and excellent psychometric properties.[4,8] The motor and phonic tics are rated separately on a 0–5 scale across 5 dimensions: number, frequency, intensity, complexity, and interference. Although motor and phonic tics are rated separately, the anchor point descriptions used to guide scoring are the same for both motor and phonic domains. The scores from each dimension (number, frequency, intensity, complexity, and interference) are summed to produce the Total Motor Tic score (range 0–25), the Total Phonic Tic score (range 0–25), and the combined Total Tic score (range 0–50). The scale also includes a separate Impairment scale that reflects overall tic-related impairment (range 0–50).

Procedures

Standard protocol approvals, registrations, and patient consents

Local institutional review boards approved all study procedures for each research protocol. After explaining study procedures, adult participants provided consent and a parent provided permission for minors (with minor assent).

Table 1 Participant characteristics and comparison of child and adult participants

	Total sample (n = 617), n (%)	Child participants (n = 516), n (%)	Adult participants (n = 101), n (%)	Effect size
Demographics				
Male	441 (71.5)	380 (73.6)	61 (60.4)	0.11[b]
White	474 (76.8)	393 (76.1)	81 (80.2)	0.04
Hispanic	79 (12.8)	66 (12.8)	13 (12.9)	<0.01
Asian/Pacific Islander	26 (4.2)	21 (4.1)	5 (5)	0.02
African American	12 (1.9)	11 (2.1)	1 (1)	0.03
Other	13 (2.1)	12 (2.3)	1 (1)	0.03
Unknown	13 (2.1)	13 (2.5)	0 (0)	0.07
Co-occurring disorders[a]				
ADHD	209 (33.9)	183 (35.5)	26 (25.7)	0.08
OCD	168 (27.2)	151 (29.3)	17 (16.8)	0.10[b]
Anxiety disorder	215 (34.8)	197 (38.2)	18 (17.8)	0.16[c]
Depressive disorder	38 (6.2)	31 (6.0)	7 (6.9)	0.01
	Mean (SD)	**Mean (SD)**	**Mean (SD)**	***d***
Age	15.13 (10.43)	11.32 (2.76)	34.64 (13.11)	3.98[c]
YGTSS Motor Total score	14.37 (4.45)	14.21 (4.65)	15.16 (3.17)	0.21[d]
YGTSS Phonic Total score	9.35 (5.45)	9.67 (5.44)	7.70 (5.20)	0.36[c]
YGTSS Total Tic score	23.71 (7.84)	23.88 (8.04)	22.86 (6.71)	0.13
YGTSS Impairment score	22.90 (10.94)	22.61 (11.58)	24.38 (6.23)	0.16

Abbreviations: ADHD = attention-deficit/hyperactivity disorder; OCD = obsessive-compulsive disorder; YGTSS = Yale Global Tic Severity Scale.
[a] Included only current psychiatric diagnoses, not lifetime. ADHD included inattentive type, hyperactive type, and combined type. Anxiety disorders included separation anxiety, social phobia, generalized anxiety, specific phobia, panic disorder, agoraphobia, and anxiety disorders not otherwise specified. Depressive disorders included major depressive disorder, dysthymia, or depressive disorder not otherwise specified.
[b] $p < 0.01$.
[c] $p < 0.001$.
[d] $p < 0.05$.

Participants (and their parents for youth) completed clinician-administered measures to assess psychiatric diagnoses (ADIS-C/P, SCID, K-SADS, MINI-KID, or clinical interview). The same or another clinician trained to reliability administered the YGTSS to assess tic symptom severity. Supervision on assessments varied slightly across protocols. However, all raters received regular supervision from investigators with extensive TD assessment experience at the local study site, or, for multisite trials, through monthly teleconference calls.

Analytic plan

First, descriptive statistics characterized the demographics, co-occurring psychiatric conditions, tic symptom severity, and tic-related impairment of the sample. Second, to check for age differences, χ^2 and t tests compared clinical and demographic differences between youth and adults. p Values and effect sizes were calculated (Cramer V for categorical and Cohen d for continuous comparisons). Third, Cronbach α examined the internal consistency of the YGTSS Motor Tic score, YGTSS Phonic Tic score, YGTSS Total Tic score, and YGTSS Total Tic and Impairment score. Fourth, we examined the distribution of the Total Motor, Total Phonic, and Total Tic scores, the Impairment score, and individual YGTSS severity items. For an initial evaluation on the normality of these individual and summary scores, we used Kolmogorov-Smirnov and Shapiro-Wilk tests. Because these normality tests may be unreliable for larger sample sizes,[25] we also used z scores to identify the magnitude of skewness (i.e., degree of asymmetry in the distributions). z Scores larger than 1.96 were considered significant. Negatively skewed distributions have a longer tail on the left that indicates more frequent use of higher scores (i.e., the median > mean). By contrast, positively skewed distributions have a longer tail on the right, reflecting more frequent use of lower scores (median < mean). Means, SDs, and distributions were examined to develop suggestions on strategic revisions of the YGTSS. Using a modified Delphi method, consensus was achieved through an iterative

process.[26] The measurement concerns and initial anchor point revisions were proposed by 2 study authors (J.F.M., L.S.). These concerns and proposals were independently reviewed by a panel of experts (other authors of this report). Expert panel members then provided independent comments and feedback that were integrated and summarized into a second and third round of anchor point revisions. The panel approved the appropriateness of the final set of revisions.

Data availability

Study data for the primary analyses presented in this report are available upon reasonable request from the corresponding and senior author.

Results

Participants

Table 1 presents the demographic and clinical characteristics of the sample. Compared to the adult sample (≥18 years), youth <18 years of age had a higher proportion of male participants, higher prevalence of OCD and anxiety disorders, and a 2-point higher mean score on Total Phonic Tic score. Other than these minor differences, the adult and pediatric samples were similar. Thus, the adult and pediatric samples were combined.

Internal consistency of YGTSS summary scores

The internal consistency for Total Motor, Total Phonic, and Total Tic scores suggested solid coherence of the subscale scores and the Total Tic score (table 2).[27] In addition, one-by-one removal of individual dimension scores produced internal consistencies that suggest that no single item was a threat to the overall internal consistency of the scale (table 2).

Distribution of YGTSS scores

Table 3 presents the descriptive statistics and distribution for YGTSS Total Motor, Total Phonic, and Total Tic Impairment scores, and individual YGTSS dimension scales (figure e-1, links.lww.com/WNL/A422, presents distribution of Impairment scores). Using a z score of 1.96 to define skewness, the Total Phonic Tic score, Total Tic score, and Impairment score did not depart from a normal distribution. The Total Motor Tic score showed a negative skew (infrequent use of lower scores). At the individual dimension level, all 5 Motor scores and all 5 Phonic scores were significantly skewed (table 3 and figure 1). Across the Motor and Phonic dimensions, both positive and negative skewness were observed. Furthermore, some Motor Tic and Phonic Tic dimensions were skewed in opposite directions (e.g., Motor and Phonic Number dimension). Because anchor point descriptions serve the same Motor and Phonic tic dimension, any revision to the anchor point description could have contrary effects. For example, a revision to the Number dimension would have opposing effects on Motor and Phonic tic severity. As shown in table 3, 3 dimensions (Frequency, Complexity, and Interference) were significantly skewed in the same direction across Motor and Phonic tic dimensions. The Frequency dimension was negatively skewed for Motor and Phonic tic dimensions (infrequent use of lower scores). Complexity and Interference were positively skewed for Motor and Phonic dimensions (infrequent use of higher scores). Based on these observations, the following minor revisions to the YGTSS Frequency, Complexity, and Interference dimensions were undertaken.

Table 2 Internal consistencies of Yale Global Tic Severity Scale (YGTSS) scores (n = 617)

	Coefficient α	Coefficient α, if item removed
YGTSS Total Tic score and Impairment score	0.67	
YGTSS Total Tic score	0.82	
Motor Number		0.80
Motor Frequency		0.82
Motor Intensity		0.81
Motor Complexity		0.80
Motor Interference		0.81
Phonic Number		0.79
Phonic Frequency		0.81
Phonic Intensity		0.79
Phonic Complexity		0.80
Phonic Interference		0.79
YGTSS Motor Tic score	0.80	
Number		0.73
Frequency		0.79
Intensity		0.76
Complexity		0.76
Interference		0.77
YGTSS Phonic score	0.87	
Number		0.82
Frequency		0.85
Intensity		0.81
Complexity		0.87
Interference		0.84

Standardization of anchors across dimensions

To support consistency across dimensions, we suggest using the same qualitative designations: none, minimal, mild, moderate, marked, and severe for scores of 0–5, respectively.

Tic Frequency dimension

As shown in table 3, the mean score for Motor Frequency was 4.08 and Phonic Frequency was 3.00. Although a score of 1

Table 3 Distribution of Yale Global Tic Severity Scale scores across participants (n = 617)

	Mean (SD)	Mode/median	Range	Interquartile range	Skew	Skew *z*	Direction
Total Tic Severity score	23.71 (7.84)	22/24	4–50	10	0.17	1.72	None
Total Impairment score	22.90 (10.94)	20/20	0–50	10	−0.19	1.94	None
Total Motor Tic score	14.37 (4.45)	16/15	0–25	5	−0.58	5.82	Negative
Number	3.13 (1.21)	4/3	0–5	2	−0.33	3.39	Negative
Frequency	4.08 (1.14)	5/4	0–5	1	−1.54	15.72	Negative
Intensity	2.98 (1.00)	3/3	0–5	2	−0.26	2.65	Negative
Complexity	2.10 (1.38)	3/2	0–5	2	−0.21	2.14	Positive
Interference	2.08 (1.21)	1/2	0–5	2	0.55	5.56	Positive
Total Phonic Tic score	9.35 (5.45)	0/10	0–25	6	−0.11	1.08	None
Number	1.70 (1.12)	2/2	0–5	1	0.53	5.45	Positive
Frequency	3.00 (1.72)	4/4	0–5	2	−0.58	5.95	Negative
Intensity	2.19 (1.25)	2/2	0–5	1	−0.30	3.05	Positive
Complexity	0.97 (1.37)	0/0	0–5	2	1.13	11.55	Positive
Interference	1.49 (1.19)	1/1	0–5	1	0.86	8.77	Positive

Positive skew indicates greater use of lower scale scores. Negative skew indicates greater use of higher scores.

was rarely used, scores of 4 and 5 predominate (figure 1). These observations are consistent with the significant negative skew of this dimension (infrequent use of lower scores). Based on these observations, the anchor point description for the score of 1 on the Frequency dimension was dropped. In the revised set of anchor points (table 4 and table e-1, links.lww.com/WNL/A423), the 3 key elements of the Frequency dimension (duration of tic-free intervals, frequency of tic bouts, and whether the bouts of tics occur in 1 or more settings) are presented incrementally for scores 1–5. The phrase in the original anchor description "periods of sustained bouts" has been removed from descriptions of moderate or marked, as it is arguable that the expression "sustained bouts" is captured in the Complexity dimension.

Tic Complexity dimension

The original description for a Complexity score of zero read "If present, all tics are clearly 'simple' (sudden, brief, purposeless) in character." This description is unlike any other zero score on YGTSS dimensions, where a score of zero is "none" or "no tics present." To match the other dimensions, we inserted "No tics present" for the Complexity score of 0 (tables 4 and e-1). This should remedy the high frequency of zeros for the Motor and Phonic Complexity items (figure 1). The former description of 0 (i.e., "If present, all tics are clearly 'simple' [sudden, brief, purposeless] in character") is now aligned with a score of 1 (minimal); the former description for a score of 1 (borderline) is now aligned with a score of 2. The description of moderate (score of 3) is similar to the original, except that the wording "may occur in orchestrated bouts" was removed. The mention of orchestrated bouts is reserved for ratings of marked and severe (scores of 4 and 5, respectively). Scores of marked and severe are delineated by the presence of behavior that could or could not be explained as normal behavior due to the extreme nature of the behavior.

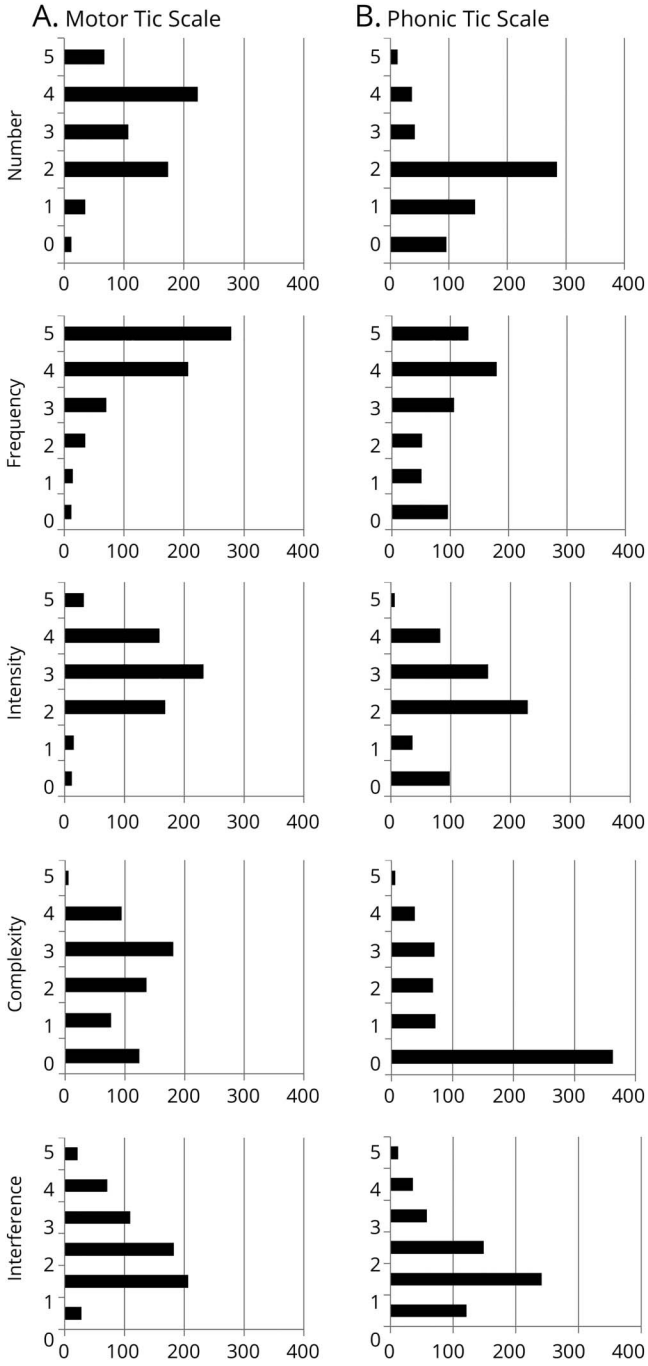
Tic Interference dimension

The Interference dimension turns on 2 elements: whether tics interrupt the flow of behavior or speech and whether tics actually disrupt intended action or speech. The descriptions for minimal and mild items were not changed. However, to distinguish the anchor point for moderate, we added the phrase "but do not disrupt intended behavior or speech" (table 4). Descriptions of marked and severe were not changed.

Tic Number dimension

The Number dimension showed a negative skew for Motor (infrequent use of lower scores) and a positive skew for Phonic (infrequent use of higher scores). Thus, anchor point revision would not be useful. As shown in figure 1, the 2 most common Phonic Tic Number scores in this sample were 1 (single phonic tic) or 2 (2–5 multiple discrete tics). The score of 3 (>5 multiple discrete tics) was rarely used. Although it may be possible that individuals with TD have a greater diversity of motor tics than phonic tics, the difference in the Number scores may be attributed to the limited number of examples on the YGTSS Phonic Tic Symptoms Checklist. In addition, some entries on the Phonic Symptom Checklist are categories rather than separate tics (e.g., animal noises rather than a list of specific noises). By contrast, the Motor Symptom Checklist is more detailed. In order to reduce the differences

Figure 1 Distribution of Yale Global Tic Severity Scale item scores in the sample of 617 children and adults with tic disorders



(A) Motor Tic scale. (B) Phonic Tic scale.

between Motor and Phonic Checklists, the revised YGTSS includes a longer list of phonic tic symptoms based on commonly endorsed tics in the Comprehensive Behavioral Intervention for Tics trials (e.g., snorting, gulping, whistling). Rater training should remind clinicians that each phonic tic should be counted separately when making ratings on the Number dimension.

Discussion

This article examines the internal consistency and distribution of YGTSS tic severity scores in a well-characterized sample of children and adults with TD. To our knowledge, this is the largest sample of participants with TD evaluated using the YGTSS. Consistent with prior research,[28] only minor differences between children and adults with TD were observed. The YGTSS Total Motor Tic score, Total Phonic Tic score, and Total Tic score showed good internal consistency across component scales (α values ranged from 0.82 to 0.87), and no improvement in internal consistency was observed if a specific item was removed from the scale. These observations are consistent with prior reports.[4,8,10–12] Thus, the findings support the internal consistency of the YGTSS, and support its use as a measure of tic symptom severity in children and adults.

The overall aim of the minor anchor point revisions to the YGTSS was to promote use of the entire range of these scales. For the negatively skewed distribution of Motor and Phonic Tic Frequency (infrequent use of lower scores), revisions to the anchor point descriptions are intended to promote use of lower severity scores on these dimensions (table 4). Briefly, the description for a score of 1 was dropped and a more severe description was provided for the score of 5. Scores in between 1 and 5 were dropped 1 unit without changing the anchor point descriptions. To repair the positively skewed distribution of the Motor and Phonic Tic Complexity dimension (infrequent use of higher scores), we revised the score of zero to be consistent with all other YGTSS dimensions to read "no tics present." This revision shifted the former anchor point descriptions upward by 1 unit, and called for minor clarification to differentiate scores for 4 and 5. Finally, the positively skewed distribution of the Motor and Phonic Tic Interference dimension implied that the anchor points needed revision to capture incremental description on interruption and disruption of intended behavior and speech. These proposed minor revisions are offered to improve the precision of the YGTSS, and do not controvert the reliability and validity of findings from prior studies using this measure. Based on discussion and final consensus of our expert panel, the revised YGTSS (referred to as the YGTSS-Revised [YGTSS-R]) is recommended for use in clinical practice and research. A copy of the YGTSS-R can be obtained online or from J.F.L. or L.S.

These study findings need to be considered in light of several limitations. First, these participants were recruited from TD and OCD specialty clinics and may not generalize to the wider populations with TD. Second, the sample consisted primarily of patients with TD, which may have contributed to the use of higher scores on some YGTSS dimensions. However, our sample appears similar to samples in prior psychometric evaluations of the YGTSS. Thus, our sample appears representative of cases in clinical practice. Finally, although YGTSS raters were trained to reliability, we did not examine interrater or test–retest reliability across sites and raters.

Table 4 Proposed revisions to Yale Global Tic Severity Scale anchors for frequency, complexity, and interference

	Rating
Frequency	
None: No specific evidence of tics.	0
Minimal: Specific tics are usually present on a daily basis, but there are long tic-free intervals during the day. Bouts of tics may occur on occasion, but are not sustained for more than a few minutes at a time.	1
Mild: Specific tics are present on a daily basis. Tic-free intervals as long as 3 hours are not uncommon. Bouts of tics occur regularly, but generally limited to a single setting.	2
Moderate: Specific tics are present virtually every waking hour of every day. Bouts of tics are common and may not be limited to a single setting.	3
Marked: Specific tics are present every waking hour. Bouts of tics are common and may occur in multiple settings.	4
Severe: Specific tics are present virtually all the time. Tic-free intervals are difficult to identify and do not last more than 5–10 minutes. Bouts of tics are very common and occur in multiple settings.	5
Complexity	
None: No tics present.	0
Minimal: If present, all tics are clearly "simple" (sudden, brief, purposeless) in character.	1
Mild: Some tics are not clearly "simple" in character.	2
Moderate: Some tics are clearly "complex" (purposive in appearance) and mimic brief "automatic" behaviors, such as grooming, syllables, or brief meaningful utterances such as "ah huh," "hi" that could be camouflaged.	3
Marked: Some tics are more "complex" (more purposive and sustained in appearance) and may occur in orchestrated bouts that would be difficult to camouflage but could be rationalized or "explained" as normal behavior or speech (tapping, saying "you bet" or "honey," "FF," "sh," brief echolalia).	4
Severe: Some tics are very "complex" in character and tend to occur in sustained orchestrated bouts that would be difficult to camouflage and could not be easily rationalized as normal behavior or speech because of their duration or their unusual, inappropriate, bizarre, or obscene character (a lengthy facial contortion, touching genitals, echolalia, speech atypicalities, bouts of copropraxia, self-abusive behavior, or coprolalia).	5
Interference	
None: No tics present.	0
Minimal: When tics are present, they do not interrupt the flow of behavior or speech.	1
Mild: When tics are present, they occasionally interrupt the flow of behavior or speech.	2
Moderate: When tics are present, they frequently interrupt the flow of behavior or speech, but do not disrupt intended behavior or speech.	3
Marked: When tics are present, they frequently interrupt the flow of behavior or speech, and they occasionally disrupt intended action or communication.	4
Severe: When tics are present, they frequently disrupt intended action or communication.	5

The YGTSS is the most commonly accepted outcome measure for tic symptom severity in children and adults with TD. The proposed revisions to the YGTSS do not change the overall architecture of the scale, or controvert the reliability and validity of the original scale. These strategic revisions expand the Phonic Tic Symptom Checklist and anchor points for 3 YGTSS dimensions to promote full use of scales for these dimensions.

Author contributions

Dr. McGuire had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis. Study concept and design: Drs. McGuire, Piacentini, and Scahill. Acquisition of data: Drs. McGuire, Piacentini, Storch, Murphy, Ricketts, Woods, Walkup, Peterson, Wilhelm, Lewin, McCracken, and Scahill. Analysis and interpretation of data: Drs. McGuire, Piacentini, Storch, Murphy, Ricketts, Woods, Walkup, Peterson, Wilhelm, Lewin, McCracken, Leckman, and Scahill. Drafting of the manuscript: Drs. McGuire, Piacentini, Woods, Walkup, and Scahill. Critical revision of the manuscript for important intellectual content: Drs. McGuire, Piacentini, Storch, Murphy, Ricketts, Woods, Walkup, Peterson, Wilhelm, Lewin, McCracken, Leckman, and Scahill. Statistical analysis: Drs. McGuire, Piacentini, and Scahill. Obtained funding: Drs. McGuire, Piacentini, Storch, Murphy, Ricketts, Woods, Walkup, Peterson, Wilhelm, Lewin, McCracken, Leckman, and Scahill. Administrative, technical, or material support:

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Disclosure

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FULL-LENGTH ARTICLE NPub.org/ui9abp

A multicenter examination and strategic revisions of the Yale Global Tic Severity Scale

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Study question

Are Yale Global Tic Severity Scale (YGTSS) subscales internally consistent and appropriately distributed?

Summary answer

YGTSS subscale scores exhibit high internal consistency, but had a skewed distribution for Frequency, Complexity, and Interference dimensions. The skewed distributions of these subscales guided the strategic revision of the YGTSS.

What is known and what this paper adds

Previous small, single-site studies of YGTSS Total Tic Scores have reported high internal consistency, interrater reliability, and test-retest reliability, but these studies could not adequately evaluate YGTSS component scores. This large, multisite study evaluated the component scores.

Participants and setting

This study recruited 617 participants with tic disorders (71.5% men; mean age, 15 ± 10 years; age range, 5–69 years) from 7 US academic centers specializing in tic disorders and obsessive-compulsive disorder.

Design, size, and duration

The YGTSS was administered by clinicians trained to reliability.

Primary outcomes

The primary outcomes were the internal consistency and distribution of YGTSS dimension scores (Number, Frequency, Intensity, Complexity, and Interference). Deviation from normality was defined as a z score >1.96.

Main results and the role of chance

This study detected high internal consistency for YGTSS Total Tic score, and Motor Tic and Phonic Tic subscales.

Table Internal consistencies of YGTSS scale scores

YGTSS score type	α Coefficient
Total Tic score and Impairment score	0.67
Total Tic score	0.82
Motor Tic score	0.80
Phonic Tic score	0.87

Although the study found no departures from normality in the distributions of YGTSS Total Tic scores (z = 1.72) and Total Impairment scores (z = 1.94), analyses of specific dimensions revealed that higher scores were more often used on the Frequency dimension (z = 5.95–15.72). By contrast, lower scores were more often used on the Complexity dimension (z = 2.14–11.55) and Interference dimension (z = 5.56–8.77).

Bias, confounding, and other reasons for caution

This study did not assess test-retest reliability or site differences.

Generalizability to other populations

The generalizability of the results to the wider population of patients with tic disorders may be limited due to the ascertainment from specialty centers and most (552/617; 89.5%) participants have a diagnosis of Tourette syndrome.

Study funding/potential competing interests

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A draft of the short-form article was written by M. Dalefield, a writer with Editage, a division of Cactus Communications. The authors of the full-length article and the journal editors edited and approved the final version.

