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The MOVES: A Self-Rating Scale for Tourette's Syndrome

GARY R. GAFFNEY, M.D.,¹ KARL SIEG, M.D.,² and JESSICA HELLINGS, M.D.²

ABSTRACT

A self-report scale for the symptoms of Tourette's syndrome was designed to be quickly and easily completed by children, adolescents, or adults. The Motor tic, Obsessions and compulsions, Vocal tic Evaluation Survey (MOVES) generates scores on five subscales: Motor Tics, Vocal Tics, Obsessions, Compulsions, and Associated Symptoms (echolalia, echopraxia, coprolalia, copropraxia). Subscales scores can be combined to form a Tic Subscale or an Obsessive-Compulsive Subscale. A sample of patients with Tourette's syndrome ($n = 30$) scored significantly higher on the Total Scale and in all Subscales, in comparison with non-referred community controls ($n = 26$) and psychiatric controls ($n = 23$).

The MOVES subscales correlated significantly (Pearson = 0.6–0.8) with independent examiner-rated scales, including the Yale Tourette's Syndrome Global Severity Scale, Shapiro Tourette Clinical Rating Scale, and two scales for obsessive and compulsive symptoms (Assessor, Beaumont). The MOVES appeared sensitive to clinical change, and might provide useful diagnostic separation of Tourette's syndrome patients from psychiatric and normal controls. The MOVES exhibited good sensitivity (87%) and specificity (94%) for diagnosis, and both positive and negative predictive values were satisfactory ($\geq 90\%$). The MOVES took approximately 1–5 minutes to complete, depending on the age of the respondent. If the validity of this instrument can be demonstrated for use by specific age groups (adolescents and children), clinicians and researchers may find the MOVES helpful in documenting patients' subjective impressions of their symptoms of tic disorders.

INTRODUCTION

GILLES DE LA TOURETTE'S SYNDROME (TS) consists of multiple, waxing and waning, chronic motor and vocal tics (American Psychiatric Association 1994). Patients exhibiting the syndrome may also manifest obsessions, compulsions, depression, and other mental phenomena (Caine et al. 1988, Cath et al. 1992, Comings and Comings 1985, Comings and Comings, 1987, Lang 1992, Lees et al. 1984, Leonard et al. 1992, Pittman et al. 1987, Robertson et al. 1988). Thus, TS presents as a model neuropsychiatric disorder exhibiting both motor and psychological phenomena.

Interest in the pathogenesis and treatment of TS has recently increased, since use of dopamine-blocking agents, serotonin reuptake inhibitors, and the alpha-adrenergic agent clonidine can ameliorate many of the motor and possibly mental symptoms (Shapiro et al. 1983, Shapiro and Shapiro, 1984, Shapiro et al. 1987,

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Riddle et al. 1992). However, there remain many questions about these agents concerning their efficacy to abate and their propensity to exacerbate the mental symptoms (Linet 1985). Most studies assess the patient's response to medication by utilizing examiner-completed objective clinical scales or by evaluating videotape recordings (Caine et al. 1979, Goetz et al. 1987a and b, Harcherik et al. 1984, Leckman et al. 1986). This methodology, valuable as it is, fails to reflect the patient's subjective response to their motor and vocal symptoms, or the patient's psychological state. Our clinical experience suggests that often TS patients become more concerned about their mental state than the physical movements. Therefore, we have developed a new self-report scale for use in the evaluation of TS patients—the Motor tic, Obsession and compulsion, and Vocal tic Evaluation Survey (the MOVES, see Fig. 1).

We designed the MOVES to be easily and quickly completed by patients from elementary school age to adult. Five subscales were designed in the questionnaire: Motor Tics, Vocal Tics, Obsessions, Compulsions, and Associated Symptoms (echolalia, echopraxia, coprolalia, copropraxia). Subscales scores can be combined to form a Tic Subscale or an Obsessive-Compulsive Subscale.

We report on the psychometric properties of the MOVES, including reliability, validity, and ability to separate TS patients from non-TS psychiatric patients and from control subjects. We also estimated the sensitivity, specificity, and diagnostic predictive value of the questionnaire.

METHODS

The main body of the MOVES contains 16 basic statements that describe four main symptoms: motor tics, vocal tics, obsessions, and compulsions. Each of the four symptoms is specified by four statements.

MOVE SURVEY				
Answer the questions below for the past _ week(s).	NEVER	SOMETIMES	OFTEN	ALWAYS
1. I make noises (like grunts) that I can't stop.				
2. Parts of my body jerk again and again, that I can't control.				
3. I have bad ideas over and over, that I can't stop.				
4. I have to do things in certain order or certain ways (like touching things).				
5. Words come out that I can't stop or control.				
6. At times I have the same jerk or twitch over and over.				
7. Certain bad words or thoughts keep going through my mind.				
8. I have to do exactly the opposite of what I'm told.				
9. The same unpleasant or silly thought or picture goes through my mind.				
10. I can't control all my movements.				
11. I have to do several movements over and over again, in the same order.				
12. Bad or swear words come out that I don't mean to say.				
13. I feel pressure to talk, shout, or scream.				
14. I have ideas that bother me (like germs or like cutting myself).				
15. I do certain things (like jumping or clapping) over and over.				
16. I have habits or movements that come out more when I'm nervous.				
17. I have to repeat things that I hear other people say.				
18. I have to do things I see other people do.				
19. I have to make bad gestures (like the finger).				
20. I have to repeat words or phrases over and over.				

FIG. 1. Motor tic, Obsession and compulsion, and Vocal tic Evaluation Scale (MOVES).

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The motor and vocal tic items can be subdivided into simple and complex. An additional four questions adds a fifth subscale of associated symptoms—copropraxia, echolalia, echopraxia, and palilalia. The patient checks one of four frequency categories (never, sometimes, often, or always), and these responses are then scored 0–3. For clinical scoring, the Motor Tic and Vocal Tic scores are added to produce a Tic Subscale; the Obsessive and Compulsive Scores are added to produce an Obsessive–Compulsive Subscale. Scores on the Basic 16 items and Total 20 items (that include the associated symptoms) are included in this report.

Following consent, the examiner instructed the subjects to fill out the questionnaire, answering the items based on their experience over the previous week. All subjects filled out the survey by themselves. In the case of the children, parents were not asked to assist in the process. Subjects were asked to refrain from any questions about the survey until completing all their responses. The MOVES questionnaire took approximately 1–5 minutes to complete, depending on the age of the respondent.

Ninety-five subjects completed the MOVES during an outpatient visit or hospitalization. The majority of subjects with TS ($n = 30$), chronic motor tic (CMT, $n = 23$), and obsessive–compulsive disorder (OCD, $n = 8$) were seen consecutively in a specialized outpatient neuropsychiatric movement-disorders clinic. Psychiatric controls ($n = 23$) consisted of patients seen in a parallel general child psychiatry clinic, and several from a parallel adult outpatient clinic; the ages of these subjects tended to vary less, because the Tic Disorder Clinic attracted children and adults as patients. These psychiatric control subjects did not have tic disorders, as ascertained by clinical interview. Nonpsychiatric control subjects ($n = 26$) were recruited from community volunteers, who were in the same age range as the TS subjects. These nonreferred control subjects also did not show tic disorders on interview or have other clinical psychiatric history. Subjects were excluded from the study if they had a seizure disorder or other history of neurological disorder. For subjects who had multiple questionnaire administrations, the most complete dataset was selected for analysis.

Subjects were rated on objective instruments based on data collected in a semistructured clinical interview by one author (GRG), a board-certified child psychiatrist in charge of the Neuropsychiatric Movements Disorder Clinic. We objectively rated tic severity using the Yale Tourette's Symptom Global Severity (TSGS) Scale (TSGS, Harcharik et al. 1984), a scale that assesses motor and vocal tics (both simple and complex) as well as psychosocial functioning. We also scored subjects on the Shapiro Tourette Clinical Rating Scale, a four-point scale of tic disorder severity (Shapiro et al. 1983); a modified Assessor's Obsessive–Compulsive Scale, an eight-point scale of severity and anxiety concerning obsessions and compulsions (Philpott 1975); and the Beaumont four-point scale for obsessions and compulsions (Beaumont 1975). The rater completing these instruments was blind to the subjects' MOVES data. All clinical diagnoses were made using DSM-III-R criteria by clinicians who were blind to the MOVES score. We calculated statistics using Systat (Wilkinson et al. 1987).

Test-retest reliability was studied in 19 subjects, with the two MOVES administered at least 2 weeks apart. We assessed sensitivity to change by consecutive administration of the survey to 16 patients pre- and posttreatment. We examined reliability with a split-half reliability coefficient. We computed item scale correlations for all 20 items.

Concurrent validity was measured by comparing (1) the TSGS Total and Tic Scores to the MOVES Total and Tic Scale Scores, and (2) the Assessor's Scale for Obsessions and Scale for Compulsions to the MOVES Obsessions and Compulsion Scales, using Pearson's correlation. MOVES scores were stratified by the Shapiro Global Scale (0–4) for Tourette's Disorder, and by the Beaumont Scales for Obsessions and Compulsions (also 0–4), and then they were analyzed by analysis of variance (ANOVA). Some of the subscales were not normally distributed, and a nonparametric analysis was used (Kruskal–Wallis).

We divided our subjects into two age groups: age 14 years and below, and age 15 and above. Since many self-report scales vary based on maturity and development, the validity measures were determined for each age group. Results are reported for the entire sample, as well as broken down into the two age groups.

To determine if the MOVES could be useful in diagnosis, we compared the means of the control group, the psychiatric control group, and the TS group on the subscales and the total scale scores. By graphing out those means, we selected cut-off scores of 10 and 15 to test. These measures were examined for sensitivity, specificity, positive predictive value, and negative predictive value.

Sensitivity refers to the ability of the test to correctly identify subjects with TS (expressed in the ratio of the number of cases of TS correctly-identified by the MOVES, divided by the total number of TS cases in

a sample). Specificity refers to the ability of the test to correctly identify subjects without TS (expressed in the ratio of the number of cases without TS correctly-designated by the MOVES, divided by the total number of non-TS cases in a sample). Positive predictive value (the number of cases of TS correctly identified by the MOVES, divided by the total number of cases designated [correctly or incorrectly] as TS by the MOVES), and negative predictive value (the number of cases without TS correctly designated by the MOVES, divided by the total number of cases designated [correctly or incorrectly] as non-TS by the MOVES) reflect the confidence that, when the MOVES classifies a case as having (or as not having) TS, this designation is in agreement with the clinical diagnosis.

RESULTS

Total sample age and gender

The sample size for the TS group was 30 (27 males, 3 females), for the psychiatric control group was 23 (16 males; 7 females), and for the nonreferred control group was 26 (11 males; 5 females); also, sample size for the CMT group was 8 (6 males; 2 females) and for the OCD group was 8 (4 males; 4 females). The ages (mean \pm S.D.) of the groups were: TS 22.8 \pm 14.2 years, psychiatric controls 16.1 \pm 13.0 years, and nonreferred controls 24.1 \pm 13.4 years; also, CMT 17.8 \pm 10.8 years, and OCD 25.5 \pm 18.4 years. The OCD and CMT groups were eliminated from some analyses because of the small number of subjects in those groups and also because of their phenomenological similarity to the TS group. There were no differences between males and females on any measure, so we combined the genders in all data analyses.

TABLE 1. MOVES MAJOR SCALE SCORES FOR PATIENTS WITH TOURETTE'S SYNDROME, CHRONIC MOTOR TIC DISORDER, OBSESSIVE COMPULSIVE DISORDER, AND TWO CONTROL GROUPS

	<i>NRC</i>	<i>PC</i>	<i>TS</i>	<i>CMT</i>	<i>OCD</i>
<i>All ages</i>	<i>n</i> = 26	<i>n</i> = 23	<i>n</i> = 30	<i>n</i> = 8	<i>n</i> = 8
Basic 16 ^a	3.7 \pm 3.6	4.6 \pm 3.7	16.5 \pm 6.4	7.2 \pm 1.9	13.6 \pm 9.1
Total 20 ^a	4.6 \pm 4.5	5.4 \pm 4.2	19.3 \pm 7.6	8.3 \pm 2.8	15.8 \pm 11.4
Tic ^a	2.2 \pm 2.0	2.3 \pm 1.8	9.5 \pm 3.7	4.0 \pm 2.8	5.3 \pm 4.0
OCD ^a	1.5 \pm 1.9	2.3 \pm 2.6	7.0 \pm 3.7	2.8 \pm 1.8	8.3 \pm 5.3
<i>14 Years and under</i>	<i>n</i> = 5	<i>n</i> = 16	<i>n</i> = 13	<i>n</i> = 6	<i>n</i> = 4
Basic 16 ^b	3.60 \pm 3.36	5.13 \pm 3.98	19.46 \pm 6.01	6.83 \pm 2.04	14.50 \pm 6.25
Total 20 ^b	4.20 \pm 4.03	6.00 \pm 4.58	23.15 \pm 7.09	8.17 \pm 3.25	17.00 \pm 9.49
Tic ^b	2.20 \pm 2.59	2.50 \pm 1.86	11.15 \pm 4.14	3.67 \pm 2.94	5.75 \pm 2.50
OCD ^b	1.40 \pm 1.52	2.81 \pm 3.02	8.31 \pm 2.75	2.50 \pm 1.87	8.75 \pm 4.03
<i>15 Years and over</i>	<i>n</i> = 21	<i>n</i> = 7	<i>n</i> = 17	<i>n</i> = 2	<i>n</i> = 4
Basic 16 ^a	3.71 \pm 3.55	3.00 \pm 2.45	14.24 \pm 5.91	8.50 \pm 0.7	12.75 \pm 12.31
Total 20 ^a	4.62 \pm 4.58	4.00 \pm 2.94	16.41 \pm 6.76	8.50 \pm 0.70	14.50 \pm 14.55
Tic ^a	2.19 \pm 1.86	1.71 \pm 1.60	8.18 \pm 2.81	5.00 \pm 2.83	4.75 \pm 5.56
OCD ^a	1.52 \pm 2.11	1.29 \pm 1.11	6.06 \pm 4.07	3.50 \pm 2.12	8.00 \pm 6.98

Major scales include the Basic 16 items (concerning motor tics, vocal tics, obsessions, and compulsions); the Total 20 (the Basic 16 Items plus items on echolalia, echopraxia, palialia, and copropraxia); a Tic Subscale; and an Obsessive-Compulsive Subscale.

Data are means \pm S.D.

NRC = nonreferred controls; PC = psychiatric controls; TS = Tourette's Syndrome; CMT = chronic motor tic; OCD = obsessive-compulsive disorder.

^aKruskal-Wallis ANOVA used for All Ages and for 15 Years and over $p < 0.001$.

^bANOVA used for 14 Years and under, $p < 0.001$.

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Comparing all 5 group means using an ANOVA, the MOVES score was statistically significant for the core 16 items ($F = 25.346, p < 0.001, df = 4, 90$) and also for the 20 item scale ($F = 23.555, p < 0.0001, df = 4, 90$). To compare, the TSGS tic score across all groups, also was statistically significant ($F = 15.356, p < 0.001, df = 4, 72$) (see Table 1). Post hoc analysis revealed that the T.S. group was significantly different from control groups.

Psychometric properties

The test-retest reliability was 0.54 for the Tic Subscale ($p < 0.001$), 0.72 for the OCD Subscale ($p < 0.001$), 0.40 for the Associated Symptoms Subscale ($p < 0.005$), and 0.69 for the Total MOVES Score ($p < 0.001$). The split-half reliability coefficient was 0.87. The item scale correlations ranged from 0.41 to 0.77, and all were highly significant. The Kolomgorov–Smirnov Reference statistic for the TS group in all subscales and total scale ranged from 0.711 to 1.000, indicating a normal distribution within the group.

Table 1 shows an analysis of the major MOVES scales, Table 2 and Fig. 2 show the subscale analysis. As noted, the TS group scored significantly higher in the total score and in all subscales, including Motor tic, Vocal tic, Obsessions, Compulsions, Tic, and OCD.

Concurrent validity

The MOVES subscales correlated significantly with the other scales: Yale Tic Score vs. MOVES Tic, $r = 0.727, p < 0.001, n = 79$; Assessor's Compulsive vs. MOVES Compulsive, $r = 0.602, p < 0.002, n =$

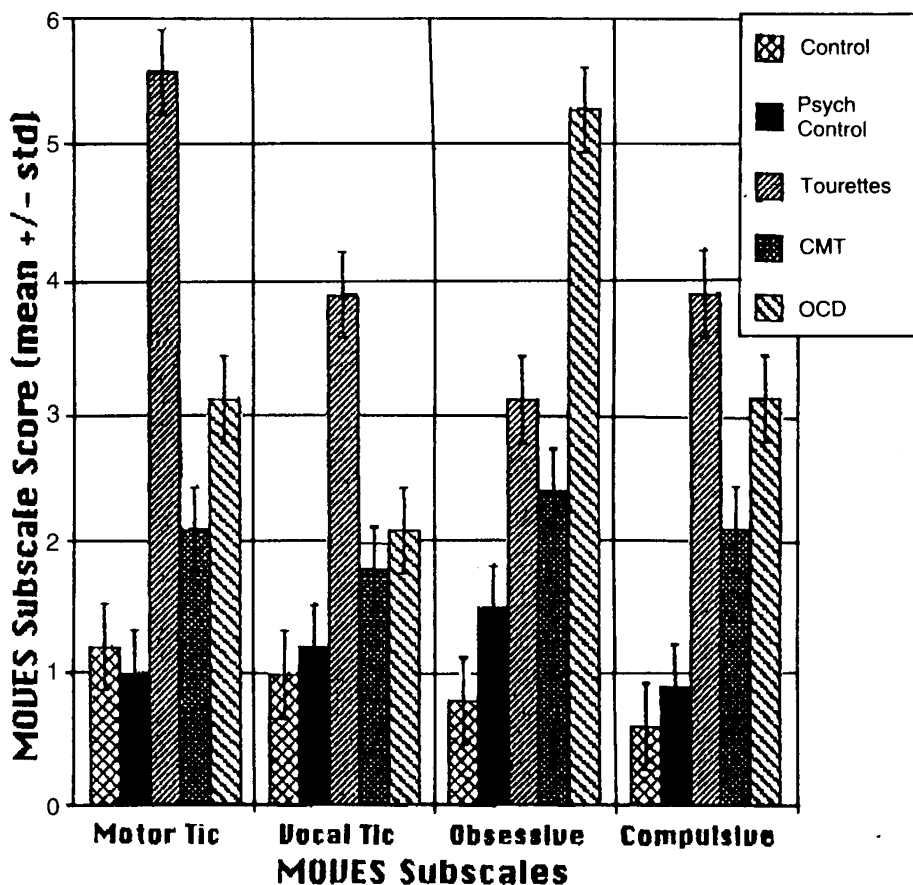


FIG. 2. Mean subscale scores for the psychiatric control, a mixed psychiatric clinic population in referred community controls; and subjects with Tourette's Syndrome, Chronic Motor Tic and Obsessive–Compulsive Disorder. All statistical comparisons are $p < 0.05$ (see Table 2).

TABLE 2. MOVES SUBSCALE SCORES FOR PATIENTS WITH TOURETTE'S SYNDROME, CHRONIC MOTOR TIC DISORDER, OBSESSIVE COMPULSIVE DISORDER, AND TWO CONTROL GROUPS

	<i>NRC</i>	<i>PC</i>	<i>TS</i>	<i>CMT</i>	<i>OCD</i>
<i>All ages</i>	<i>n</i> = 26	<i>n</i> = 23	<i>n</i> = 30	<i>n</i> = 8	<i>n</i> = 8
Motor tic ^a	1.2 ± 0.9	1.0 ± 1.4	5.6 ± 2.7	2.1 ± 1.4	3.1 ± 1.7
Vocal tic ^a	1.0 ± 1.4	1.2 ± 1.0	3.9 ± 2.1	1.8 ± 1.8	2.1 ± 2.5
Obsession ^a	0.8 ± 1.3	1.5 ± 1.9	3.1 ± 2.1	2.4 ± 1.7	5.3 ± 3.8
Compulsion ^a	0.6 ± 1.0	0.9 ± 0.9	3.9 ± 2.4	2.1 ± 1.4	3.1 ± 1.9
<i>14 Years and under</i>	<i>n</i> = 5	<i>n</i> = 16	<i>n</i> = 13	<i>n</i> = 6	<i>n</i> = 4
Motor tic ^a	1.2 ± 1.3	1.3 ± 1.5	6.3 ± 3.1	1.8 ± 2.1	3.8 ± 0.5
Vocal tic ^a	1.0 ± 1.4	1.2 ± 1.1	5.1 ± 2.4	2.8 ± 1.4	2.0 ± 2.2
Obsession ^b	1.0 ± 1.4	2.1 ± 2.2	3.8 ± 1.6	2.0 ± 2.3	5.5 ± 3.3
Compulsion ^a	0.4 ± 0.5	0.9 ± 1.1	4.5 ± 2.4	1.8 ± 2.1	3.3 ± 1.0
<i>15 Years and over</i>	<i>n</i> = 21	<i>n</i> = 7	<i>n</i> = 17	<i>n</i> = 2	<i>n</i> = 4
Motor tic ^a	1.2 ± 0.8	0.6 ± 1.1	5.2 ± 2.1	3.0 ± 0.0	2.8 ± 2.4
Vocal tic ^a	1.0 ± 1.3	1.1 ± 0.7	3.0 ± 1.5	2.0 ± 2.8	2.3 ± 3.2
Obsession ^c	0.8 ± 1.4	0.4 ± 0.5	2.5 ± 2.3	3.0 ± 2.8	5.0 ± 4.7
Compulsion ^a	0.7 ± 1.1	0.9 ± 0.7	3.5 ± 2.5	0.5 ± 0.7	3.0 ± 2.7

Data are means ± S.D.

Abbreviations are those used in Table 1.

Kruskal–Wallis ANOVA used for all analyses, except ANOVA was used for the Vocal tic and Obsession subscales obtained from the 14 Years and under group.

^a = $p < 0.001$.

^b = $p < 0.005$.

^c = $p < 0.05$.

38; Assessor's Obsessive vs. MOVES Obsessive, $r = 0.488$, $p < 0.005$, $n = 38$; and Assessor's OCD vs. MOVES OCD, $r = 0.597$, $p < 0.001$, $n = 38$.

Using the MOVES Total Score as the dependent variable and Shapiro's Global Score as the category variable, the Kruskal–Wallis ANOVA was significant (see Table 3). Analyzing the MOVES Obsessive Score as the dependent variable and the Beaumont Obsessive Score as the category variable, the ANOVA was likewise significant. Analyzing the Beaumont Compulsive Scale as the dependent variable and the Beaumont compulsive categories as the category variable, the ANOVA was significant.

Ages 7–14 years

Focusing on the 7 to 14-year-old children in the sample, the sample size of the TS group was 13 (11 males), of the psychiatric controls was 16 (13 males), and of the normal controls was 5 (all males). Mean (\pm S.D.) ages of these groups were: TS 12.3 ± 2.1 years, psychiatric controls 12.3 ± 1.7 years, and normal controls 11.8 ± 3.2 years. Two other groups—CMT 10.8 ± 1.7 years ($n = 6$, 5 males) and OCD 10.6 ± 3.5 years ($n = 4$, all males)—were eliminated from most analyses, for reasons noted above.

Concurrent validity

The MOVES subscales for the 7 to 14-year-old group correlated significantly with the other scales: Yale Tic Score vs. MOVES Tic Score, $r = 0.750$, $p < 0.001$, $n = 36$; Assessor's Compulsive Score vs. MOVES Compulsive Score, $r = 0.581$, $p < 0.01$, $n = 24$; Assessor's Obsessive Score vs. MOVES Obsessive Score, $r = 0.472$, $p < 0.05$, $n = 21$; and Assessor's OCD Score vs. MOVES OCD Score, $r = 0.565$, $p < 0.01$, $n = 21$.

Using the MOVES Total Score as the dependent variable and the Shapiro Global Score as the category variable, a Kruskal–Wallis ANOVA was significant (see Table 3). Using the MOVES Obsessive Score as

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TABLE 3. CONCURRENT VALIDITY: MOVES SUBSCALES COMPARED TO SHAPIRO GLOBAL SCALE, BEAUMONT OBSESSIVE SCALE, AND BEAUMONT COMPULSIVE SCALE

	<i>Severity score on Shapiro or Beaumont subscales*</i>				
	0	1	2	3	4
<i>All ages</i>					
Shapiro Global vs Moves Total ^b	5.7 ± 6.4 n = 13	10.8 ± 9.4 n = 12	14.8 ± 7.6 n = 12	25.7 ± 6.3 n = 7	24.0 n = 1
Beaumont Obsessive vs MOVES Obsessive ^b	6.1 ± 5.6 n = 18	15.6 ± 12.9 n = 8	16.3 ± 5.3 n = 6	22.0 ± 10.6 n = 5	NV
Beaumont Compulsive vs MOVES Compulsive ^a	0.50 ± 0.86 n = 14	2.17 ± 2.14 n = 6	3.0 ± 2.24 n = 5	2.91 ± 2.30 n = 11	10.0 n = 1
<i>14 Years and under</i>					
Shapiro Global vs Moves Total ^c	10.1 ± 9.5 n = 8	11.9 ± 8.1 n = 9	20.1 ± 6.5 n = 6	32.0 ± 4.2 n = 2	24.0 n = 1
Beaumont Obsessive vs MOVES Obsessive ^{NS}	8.1 ± 6.1 n = 11	16.0 ± 13.5 n = 5	20.0 ± 2.8 n = 2	21.7 ± 6.4 n = 3	NV
Beaumont Compulsive vs MOVES Compulsive ^c	5.2 ± 3.4 n = 8	17.3 ± 15.0 n = 3	20.0 ± 2.8 n = 2	19.1 ± 7.5 n = 7	NV
<i>15 Years and over</i>					
Shapiro Global vs Moves Total ^b	2.4 ± 1.8 n = 5	16.7 ± 16.7 n = 3	9.3 ± 3.8 n = 6	23.2 ± 5.3 n = 5	NV
Beaumont Obsessive vs MOVES Obsessive ^c	0 ± 0.96 n = 7	1.7 ± 1.5 n = 3	2.0 ± 1.2 n = 4	6.0 ± 1.8 n = 2	NV
Beaumont Compulsive vs MOVES Compulsive ^c	3.3 ± 2.8 n = 6	19.3 ± 4.9 n = 3	8.0 ± 5.7 n = 2	19.0 ± 12.9 n = 4	32 n = 1

*Top row: Group ratings of severity (0 = least severe, 4 = most severe).

Data are means ± S.D.

NV = no value available.

Kruskal–Wallis ANOVA used for all analyses, except ANOVA was used for the Beaumont Obsessive comparisons to MOVES Obsessive Subscale:

^a = $p < 0.001$.

^b = $p < 0.005$.

^c = $p < 0.05$.

^{NS} = Not significant.

the dependent variable and the Beaumont Obsessive Score as the category variable, the ANOVA was not significant. Last, using the MOVES Compulsive Scale as the dependent variable and the Beaumont Compulsive categories as the category variable, an ANOVA was again significant.

Ages 15 years and above

Focusing on the patients of ages 15 years and older, the sample size of the TS group was 17(16 males), the psychiatric control group was 7 (3 males), and the normal control group was 21 (10 males). Mean (±S.D.) ages of these groups were: TS 31.3 ± 13.7 years, psychiatric controls 27.0 ± 20.5 years, and normal controls 27.5 ± 12.6 years. The two other groups—CMT 34.5 ± 7.8 years (n = 2, 1 male) and OCD 40.5 ± 13.5 years (n = 4, 2 males)—were eliminated from most analyses, again for reasons noted above.

Concurrent validity

The MOVES subscales correlated significantly with the other scales: Yale Tic Score vs. MOVES Tic Score, $r = 0.679$, $p < 0.001$, $n = 42$; Assessor's Compulsive Score vs. MOVES Compulsive Score, $r = 0.642$,

$p < 0.01$, $n = 16$; Assessor's Obsessive Score vs. MOVES Obsessive Score, $r = 0.572$, $p < 0.05$, $n = 16$; and Assessor's OCD Score vs. MOVES OCD Score, $r = 0.689$, $p < 0.005$, $n = 16$.

Using the MOVES Total Score as the dependent variable and the Shapiro Global Score as the category variable, an ANOVA was significant (see Table 3). Using the MOVES Obsessive Score as dependent variable and the Beaumont Obsessive Score as the category variable, an ANOVA indicated a trend, but was not significant. Using the MOVES Compulsive Scale as the dependent variable and the Beaumont Compulsive Categories as the category variable, an ANOVA was significant.

Diagnostic and treatment sensitivity

We determined whether the MOVES Total Score could distinguish between the TS group and the two control groups. After graphically examining the questionnaire score distributions, cutoff scores of 10 and 15 were selected (post hoc) and tested as threshold values for the diagnosis of TS. The diagnostic efficiency of the MOVES utilizing these two cutoff scores is noted in Table 4. Both threshold scores produced similar results. Both thresholds, in this test between TS, psychiatric controls, and nonreferred control subjects, gave robust diagnostic sensitivity, specificity, and predictive value scores. A proposed threshold score of 10 needs to be tested in future samples, using larger numbers of patients of different ages, for predicting diagnosis.

In a test of the sensitivity of the MOVES to change during treatment, pretreatment and posttreatment MOVES scores were computed. Following treatment of TS, the MOVES decreased from 17.2 ± 10.7 at baseline to 11.6 ± 9.6 at follow-up ($p < 0.01$, paired t test).

DISCUSSION

The MOVES is the first self-report scale for the symptoms of TS that can be answered by children, adolescents, or adults. The data indicate that the MOVES demonstrates sufficient reliability and adequate validity, although these properties have been shown only for the entire sample and not for specific age groups. The Pearson correlation values between the MOVES and several observer-rated scales ranged between 0.6 and 0.8. These correlations are statistically significant and clinically consequential, accounting for 36% to 64% of the variance between the parallel scales, and they suggest good concurrent validity of the self-administered MOVES with standard examiner-rated scales. The MOVES appeared able to provide potentially useful separation of Tourette's syndrome patients from psychiatric and normal controls, and also appeared sensitive to clinical change. Thus, the MOVES has good psychometric properties and appeared capable of conveying useful clinical information about patients' subjective state in this first study population.

Self-report

Why develop a self-report questionnaire in TS? Past studies of TS have used examiner-rated objective scales, global ratings, and videotapes (Caine et al. 1988, Caine et al. 1979, Goetz et al. 1987a, Goetz et al. 1987b, Harcherik et al. 1984, Corbett et al. 1969). Standardized instruments require evaluator expertise,

TABLE 4. DIAGNOSTIC PERFORMANCE OF THE MOVES AT TWO CUTOFF POINTS

	<i>MOVES cutoff score</i>	
	10	15
Sensitivity	87	80
Specificity	94	98
Positive predictive value %	90	96
Negative predictive value %	94	98

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training, and generate the problems with interrater reliability. Observational and interactive instruments such as the Yale TSGS, the Yale Schedule for Tourette and Other Behavioral Syndromes, and the Yale–Brown Obsessive–Compulsive Scale (YBOCS) may take more resources because they are best given in the context of a history and physical evaluation. These instruments can consume 30 or more minutes of expert time, exclusive of the patient interview. The Yale Schedule for Tourette and Other Behavioral Syndromes is a structured interview that can take up to 2 hours to administer. Furthermore, these assessments of TS lack evaluation of patients' subjective reports of motor and mental symptoms.

The MOVES was designed to be comprehensible to patients of most ages, easy to complete, and time efficient. Although the MOVES appears potentially useful as a quick, efficient screen of the patient's subjective report, additional studies are needed with this new instrument to assess its clinical performance.

Self-report instruments have several advantages: (1) self-reports can summarize a great deal of information, (2) they are easy to administer and score, (3) self-reports conserve expert time, and (4) self-reports are easier to validate than observational methods. Problems with self-reports include: (1) reliance on the subject's interpretation of the phenomena, and (2) dependence on the subject's reading level and ability to understand the symptoms, so the language of the instrument must be basic or, alternatively, versions must be authored for different ages and reading levels (Halvorsen 1990).

Another route of data-gathering for children is parental reporting of symptoms. Some investigators believe that parents may be more reliable reporters of certain phenomena. Using the MOVES, it would be interesting to assess the degree of agreement between child and parent reports of TS symptoms.

Obsessions and compulsions in TS

TS is not exclusively a motor disorder, but rather a syndrome with both psychological and motor components. Just as evaluating only the psychological state would be inadequate, an evaluation of only the motor or vocal components of TS is inadequate.

Obsessive–compulsive symptoms have been consistently reported in TS (Caine et al. 1988, Cath et al. 1992, Comings and Comings, 1985 and 1987, Lang 1992, Lees et al. 1984, Leonard et al. 1992, Pittman et al. 1987, Robertson et al. 1988), though some investigators consider these phenomena in TS as impulsions, that is, driven behaviors without obsessive meaning (Shapiro et al. 1988). The MOVES appears useful as a quick quantitative screen of a TS patient's self-perception of these phenomena. Further, the MOVES could potentially be useful for following treatment changes, pending further study.

The Yale–Brown Obsessive–Compulsive Scale (YBOCS, Goodman et al. 1989) is a comprehensive scale, now used regularly in assessing OCD. The YBOCS was still under development when these studies were inaugurated, so we did not collect data that would allow a comparison of YBOCS scores with the OCD subscales of the MOVES. This comparison would aid in the evaluation of the concurrent validity of the MOVES in measuring obsessions and compulsions.

Diagnostic performance

We determined whether the MOVES Total Score could distinguish between the TS group and the two control groups. Using 10 and 15 as cutoff scores (selected post hoc), the diagnostic efficiency of the MOVES is summarized in Table 4. We noted 10 to be a reasonable cutoff score, exhibiting good sensitivity (87%) and specificity (94%). Both positive and negative predictive values were satisfactory ($\geq 90\%$).

Sensitivity refers to the ability of the scale to correctly classify TS cases, and specificity refers to the ability to exclude non-TS cases. Positive predictive value defines the confidence that, once a diagnosis is made, it is a correct classification. Negative predictive value defines the confidence that, when a diagnosis of TS is not made, it is the correct classification. The diagnostic properties that we ascertained in this sample were clinically satisfactory. To complement our initial findings, the MOVES should be tested on an independent sample of subjects to determine whether the diagnostic findings can be replicated. Following further study of its properties, the MOVES might be found adequate to use as a screening instrument in a large population; that is, our preliminary findings on the positive and negative predictive values suggest that the MOVES might be considered as part one of two-stage screening strategy.

Sensitivity to clinical change

The results of the study also raise the possibility that this self-report instrument may be found able, following further research, to aid in monitoring the treatment of patients with TS. The MOVES, designed from clinical experience with tic patients, appeared sensitive to clinical change. With its good reliability and good concurrent validity with examiner ratings, the MOVES appears to convey potentially useful information about a patient's subjective state.

Limitations

The MOVES was designed to be short and easy to administer. It lends itself to efficient office administration, even in frequent follow-up visits, without burdening the patient excessively. However, the MOVES would be inadequate to comprehensively evaluate a patient with TS and all its natural complexity. Other specialized scales may be indicated, such as the TSGS, the YBOCS, and the Yale Schedule for Tourette and Other Behavioral Syndromes which is an adaptation of the Schedule for Affective Disorders and Schizophrenia in School Aged Children (K-SADS) with in-depth questions concerning tics.

A limitation of this data set was the restricted age range of the psychiatric control group which, unlike the other two groups, consisted of children only. We also note that the study population had a gender distribution involving an excess males in the TS group (as would be expected from demographic studies), but not in the nonreferred control group. Although such differences in the make-up of the study groups are of concern, we failed to find any differences in responses between the genders.

Two problems limit the use of the MOVES for diagnostic purposes: The basic 20 questions do not determine duration of symptoms, and so they would not discriminate between a transient tic disorder and a chronic tic disorder, such as TS. We are currently working on a duration question. Secondly, there were insufficient numbers of OCD patients in our sample to test the ability of the MOVES to distinguish between OCD and TS. It is possible that the marked similarities between OCD and TS may prevent distinguishing between the two disorders by using a self-report scale. This study should be administered to another sample population with larger number of subjects in order to seek replication of these initial findings, to examine the psychometric and diagnostic characteristics of the MOVES for different age groups, and to determine whether there are any potential effects of comorbid disorders on the performance of the scale.

Outcome research

Health-care planners emphasize the long-term outcome of medical interventions. Clinicians' ratings of medical conditions will play a role in the assessment of treatment outcome, but the patient's perception will be vital. A self-rating scale, such as the MOVES, can be tracked over time, potentially indicating the patient's perceptions of the symptoms noted in the waxing and waning natural course of TS.

In summary, it would be useful to employ a validated subjective instrument in the evaluation of Tourette's syndrome, a neuropsychiatric disorder with both mental and physical symptoms. The goal of a subjective survey is to determine the person's impression of the symptoms of a disorder, rather than the view of an examiner or a parent. After all, the subject experiences the symptoms. Results of this initial study indicate that further research on this instrument would be feasible and potentially useful. If additional data and analysis demonstrate the validity of this instrument for use by specific age groups (adolescents and children), clinicians may find the MOVES helpful to document patients' subjective feelings concerning their symptoms, cross-sectionally and longitudinally in both intervention and outcome studies.

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