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## Clinical Correlates and Predictors of Caregiver Strain in Children with Chronic Tic Disorders

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### Abstract

Although tics are the defining feature of chronic tic disorders (CTD), many children experience comorbid internalizing and externalizing problems that contribute to impairment across several domains, including family functioning. The current study examined clinical correlates and predictors of caregiver strain in parents of children with CTD. Participants were 123 children and adolescents diagnosed with a CTD who participated in a randomized-controlled trial of behavior therapy for reducing tics. Results showed that a combination of disruptive behavior, inattention/hyperactivity, and tic intensity best explained objective strain and a combination of inattention/hyperactivity and tic intensity were the best predictors of subjective caregiver strain. Implications of these findings for care providers are discussed.

### Keywords

Tourette disorder; chronic tic disorder; caregiver strain; family functioning; externalizing; internalizing

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Chronic tic disorders (CTDs, including Tourette disorder, TD) are a class of childhood-onset neuropsychiatric disorders characterized by involuntary motor and vocal tics that vary in number, location, intensity, and complexity both between individuals and within individuals

over time (American Psychiatric Association, 2000)<sup>1</sup>. Although tics are the defining feature of CTD, most children also experience varying degrees of comorbid internalizing and externalizing problems. Among the most prevalent comorbid conditions associated with CTD are attention-deficit/hyperactivity disorder (ADHD, 40–50%), anxiety problems (10–20%), and obsessive-compulsive disorder (OCD, 30–40%; Scahill, Sukhodolsky, & King, 2007).

Given the complex presentation of CTD, it is not surprising that many children with CTD experience substantial impairment in social, educational, and physical functioning as well as decreased quality of life (Kurlan et al., 2001; Packer, 2005; Storch et al., 2010; Woods, Marcks, & Flessner, 2007). Several studies have shown that although internalizing and externalizing symptoms are often the best predictors of impairment in functioning (Storch et al., 2007; Sukhodolsky et al., 2003), tic severity may also play an important role. For example, Himle et al. (2007) examined the unique contributions of ADHD, OCD, and specific dimensions of tic severity (i.e., number, frequency, intensity, complexity, and interference) in predicting total competence scores on the Child Behavior Checklist (CBCL) and found that while ADHD and OCD symptoms predicted decreased CBCL competence scores, tic complexity was also a significant predictor.

Another area that has received recent attention is the impact of CTD and associated symptoms on caregivers and family functioning. Storch and colleagues (2007) examined the impact of tics, internalizing, and externalizing symptoms on parent reports of overall functioning and found that 24% of parents reported at least one significant tic-related problem in the “home” domain (e.g., going places, getting along with parents/siblings, sleeping, doing chores) and 39% reported at least one problem in the “home” domain related to their child’s non-tic symptoms. In another study, Conelea et al., (2011) administered the Family Impact Questionnaire (Donenberg & Baker, 1993) via an online survey to 740 parents who had a child with CTD. This study found that scores on the negative impact scale (which measures parental perceptions of a child’s negative impact on social life, finances, marriage, and siblings as well as negative feelings toward parenting) were similar to those previously reported in samples of children with cerebral palsy and Down syndrome. In addition, although higher tic severity scores predicted more negative family impact, children with CTD and at least one comorbid condition reported greater negative family impact than those with CTD-only. This latter finding is consistent with findings from Sukhodolsky et al. (2003), who found that parents of children with TS+ADHD and ADHD-only, but not parents of children with TD-only, reported higher levels of family conflict and less family cohesion than did unaffected controls.

Based on these previous studies, it is clear that the impact of CTD extends beyond the affected child. The purpose of the current study was to extend the previous literature by examining the effects of tics and comorbid symptoms on caregiver strain. Caregiver strain refers to the demands, responsibilities, difficulties, and negative consequences of caring for

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<sup>1</sup>Note that in DSM-5, Chronic Tic Disorder is now referred to as Persistent Motor or Vocal Tic Disorder. In this manuscript, we continue to use the term Chronic Tic Disorder in order to be consistent with the DSM-IV-TR criteria used to confer diagnosis at the time of the study.

a child with a chronic medical or behavioral condition and has been conceptualized as having two moderately correlated but distinct dimensions: objective strain and subjective strain (Montgomery, Gonyea, & Hooyman, 1985). *Objective strain* is defined as the observable negative effects, outcomes, and restrictions that result directly from the child's health or behavior problems (e.g., interruption of personal time, missing work, disruption of family routines, financial strain, etc.). *Subjective strain* refers to the emotional or psychological impact of parenting a child with chronic health or behavior problems (e.g., feeling isolated, worry, anger, stigma, guilt, etc.). Evidence has suggested that caregiver strain is associated with a variety of negative effects and that decreasing caregiver strain can lead to positive outcomes, including enhanced treatment response (Kazdin & Whitley, 2003).

The purpose of the current study was to examine which clinical symptoms (tic severity, disruptive behavior, inattention/hyperactivity, and anxiety) were most associated with both objective and subjective caregiver strain in parents of children with CTD. We hypothesized that disruptive behavior, inattention/hyperactivity, and specific dimensions of tic severity (e.g., tic intensity and frequency) would best predict both objective and subjective strain. In addition, we explored whether there were differences in the overall level of, and predictors of, objective and subjective strain reported by parents of children with CTD with and without comorbid psychopathology in order to gain a better picture of which symptom profiles are associated with caregiver strain in these two subgroups.

## Methods

### Participants

Participants were 123 children and adolescents (ages 9–17) diagnosed with CTD who participated in a multi-site randomized-controlled trial comparing a behavioral intervention (Comprehensive Behavioral Intervention for Tics, CBIT; Woods et al., 2008) to supportive psychotherapy for reducing tics in children with CTD (Piacentini, et al., 2010). To be eligible for the study, children must have met DSM-IV-TR criteria for TD or CTD with moderate or greater tic severity. The threshold for moderate tic severity was defined as a total tic score of greater than 13 for children with TD, or greater than 9 for children with chronic motor or vocal tics only, on the Yale Global Tic Severity Scale (YGTSS; Leckman et al., 1989). Children must also have had a measured IQ score of 80 or higher to be eligible. The presence of common comorbid conditions was not an exclusion criterion unless the comorbid disorder required immediate intervention or a change in current treatment protocol. Children receiving psychotropic medication were eligible if the dose had been stable for 6 weeks or longer at the time of study entry. A detailed description of the original study sample, as well as inclusion and exclusion criteria, can be found in Piacentini et al. (2010) and Specht et al. (2011). Although the original sample included 126 children, 3 children were excluded from the current study due to missing data. Details regarding demographic characteristics, comorbidity, and psychotropic use for the current sample are provided in Table 1. The mean age of the current sample was 11.3 years ( $SD = 2.4$ ). The sample was mostly male (78%) and Caucasian (85%) and 64% of participants met criteria for at least one comorbid psychiatric disorder in addition to a CTD.

## Procedures

A detailed description of study procedures can be found in Piacentini et al. (2010). Data were collected from participants enrolled in a randomized controlled treatment trial at three different academic centers with specialization in nonpharmacological treatment of tics. The study was reviewed and approved by the respective Institutional Review Boards at each site prior to data collection. All participants completed a baseline evaluation that included a structured diagnostic interview (ADIS-IV) as well as several parent and child self-report questionnaires to measure psychosocial functioning and symptom severity. Trained, masters-level clinicians administered all clinician-rated measures. See Table 1 for sample means and standard deviations for the measures that were administered.

## Materials

**Caregiver Strain Questionnaire (CSQ; Brannan, Heflinger, & Bickman, 1997)**—The CSQ is a 21-item caregiver-report of personal strain based on caring for a child with emotional and/or behavioral problems. Caregivers rate each item on a scale from 1 (not at all a problem) to 5 (very much a problem). The questionnaire is subdivided into two scales, objective and subjective strain, derived from exploratory and then confirmatory factor analyses. The objective strain scale is comprised of 11 items to produce a score that can range from 11 to 55. The subjective strain scale is comprised of 10 items that can produce a score ranging from 10 to 50. The scale possesses adequate internal consistency ( $\alpha=.93$ ). Though the CSQ is not normed, scores in a large sample of children from military families seeking mental health care for emotional and/or behavioral disturbances averaged 29.7 for the subjective strain scale, and 22.0 for the objective strain scale (Brannan, et al., 1997).

**Anxiety Disorders Interview Schedule for Children, Version IV (ADIS-IV; Silverman & Albano, 1996)**—The ADIS-IV is a semi-structured diagnostic interview that assesses the major DSM-IV anxiety, mood, and externalizing disorders experienced by school-aged children and adolescents. It has been shown to possess favorable psychometric properties (Silverman, Saavedra, & Pina, 2001; Wood, Piacentini, Bergman, McCracken, & Barrios, 2002).

**Yale Global Tic Severity Scale (YGTSS; Leckman et al., 1998)**—The YGTSS is a clinician-completed measure that provides 0 to 5 point ratings on five different dimensions of tic severity: tic number, frequency, complexity, intensity, and interference. Each of these dimensions is scored separately for motor and vocal tics to produce total motor tic and total vocal tic severity scores ranging from 0 to 25. The motor and vocal tic severity scores are combined to produce a total tic severity score ranging from 0 to 50, with higher numbers indicating more severe tics. The YGTSS has demonstrated acceptable internal consistency and acceptable convergent and divergent validity (Leckman et al., 1989). Factor analyses have revealed a two-factor structure (motor tics and vocal tics; Leckman, et al., 1989; Storch et al., 2005).

**ADHD Rating Scale & Disruptive Behavior Rating Scale (ADHD-RS & DBRS; DuPaul, Power, Anastopoulos, & Reid, 1998)**—The ADHD-RS is an 18-item parent rating scale designed to measure DSM-IV symptoms of ADHD. Each item is rated on a 4-

point scale (0 = not present; 3 = severe). In addition to the 18-item total score, separate nine-item inattention and hyperactivity subscale scores are calculated. The eight-item DBRS companion scale was added to the ADHD-RS as a measure of oppositional defiant behavior. On the DBRS, parents rate eight items on the same 4-point scale as the ADHD-RS, with higher numbers reflecting more severe symptoms. The ADHD-RS and the DBRS have shown to possess good psychometric properties (DuPaul et al., 1998; Friedman-Weieneth, Doctoroff, Harvey, & Goldstein, 2009)

**The Screen for Child Anxiety Related Emotional Disorders (SCARED; Birmaher et al., 1997)**—The SCARED is a 41-item parent-report used to screen for child anxiety disorders including generalized anxiety disorder, separation anxiety disorder, panic disorder, social phobia, and school phobia. The measure has both parent and child reports, however only the parent report was used in the current analyses. The measure has good test-retest reliability and internal consistency, and excellent discriminant validity (Birmaher et al., 1999).

### Analytic Strategy

Correlational analyses were used to explore the association between clinical measures (DBRS, ADHD-RS, SCARED, YGTSS) and subjective and objective caregiver strain scores. These analyses were followed by a series of stepwise regression analyses in order to examine which combination of clinical symptoms best predicted both subjective and objective strain in the overall sample as well as those with CTD with and without comorbid psychopathology. Stepwise regression was chosen because this is the first study to examine predictors of caregiver strain in children with CTD and the existing literature base is mixed with regard to the best predictors (i.e., tic symptoms versus comorbid symptoms) of other functional outcomes in children with CTD. Therefore we chose not to make a priori decisions regarding the entry order of the predictor variables examined in this study. Rather, predictor variables were entered into each step in the analysis based on their correlations with the criterion variable. Per convention, the probability for entry was set at  $p = .05$  and the probability for removal was set at  $p = .10$ . Correlates and predictors of caregiver strain were run for the whole sample and the sample split into those with and without internalizing and externalizing comorbidity. Before running analyses, predictor variables were tested for collinearity using a tolerance criterion of 0.10 and a variance inflation factor = 3. There was no evidence of multi-collinearity among the predictor variables. A series of correlation analyses and t-tests showed that neither age nor gender was associated with the predictor or criterion variables, so these variables were not included in the regression analyses.

## Results

### Correlates and Predictors of Caregiver Strain

Correlations between subjective and objective strain and various clinical measures are provided in Table 2. Results show that both objective and subjective strain scores correlated significantly with scores on measures of disruptive behavior, anxiety, ADHD, and several dimensions of tic severity (total severity, number, intensity, complexity, and interference). To examine the which symptoms best predicted objective and subjective strain, YGTSS

subscale scores (number, frequency, intensity, complexity, and interference), SCARED total scores, DBRS total scores, and ADHD-RS total scores were entered as predictors and objective and subjective caregiver strain as separate criterion in a series of stepwise regression analyses.

Results are presented in Table 3 and show that a combination of DBRS scores (disruptive behavior), ADHD-RS (inattention/hyperactivity), and tic intensity best explained objective strain for the sample. SCARED scores, as well as tic number, interference, frequency, and complexity were excluded from the model. For subjective strain, a combination of ADHD-RS (inattention/hyperactivity) and tic intensity were the best predictors while SCARED and DBRS scores, tic number, interference, frequency, and complexity were excluded from the model. For objective strain, DBRS explained more variance ( $R^2 = .238$ ) than did ADHD-RS ( $R^2 = .05$ ) and YGTSS Intensity ( $R^2 = .027$ ). For subjective strain, ADHD-RS explained more variance ( $R^2 = .257$ ) than did YGTSS Intensity ( $R^2 = .071$ ; see Table 3).

### Correlates of Caregiver Strain in Children With and Without Comorbid Diagnoses

In order to examine whether there were differences in levels and/or predictors of strain among parents of children with CTD with and without comorbidity, the sample was split into those with ( $n=82$ ) and without ( $n=41$ ) internalizing and externalizing comorbidity based on results from the ADIS-IV. Descriptive statistics for these subgroups are presented in Table 1. As expected, significantly more children in the CTD+comorbidity group were taking psychotropic medication for symptoms other than tics,  $X^2(1, N = 123) = 5.86, p = .016$ . Also, as expected, the CTD+comorbidity group showed higher levels of disruptive behavior (DBRS;  $t[120] = -4.88, p < .001$ ), internalizing problems (SCARED;  $t[117] = -4.43, p < .001$ ), and inattention/hyperactivity (ADHD-RS;  $t[116] = -6.21, p < .001$ ). There were no significant differences between those with and without comorbidity on age, gender, race, mean IQ, or tic medication status (all  $p$ 's  $> .05$ ).

Regarding overall levels of objective and subjective strain, parents of children with CTD +comorbidity reported higher overall levels of objective strain ( $t[121] = -2.07, p = .041$ ). The subgroups did not differ on overall levels of subjective strain ( $t[121] = -1.61, p = .110$ ; see Table 1). Within the CTD+comorbidity group, disruptive behavior, inattention, and hyperactivity showed the strongest correlations with both subjective and objective strain compared to internalizing problems and the tic severity variables (see Table 2). Among the CTD severity variables, only tic number showed a significant correlation with objective strain ( $r = .32; p < .01$ ) whereas tic number ( $r = .27, p < .05$ ), intensity ( $r = .24; p < .05$ ), and complexity ( $r = .22; p < .05$ ) were significantly correlated with subjective strain in this group (Table 2). Within the CTD-only group, several tic severity variables were strongly associated with both subjective and objective strain. Tic intensity ( $r = .50; p < .01$ ), interference ( $r = .49; p < .01$ ), and number ( $r = .37; p < .01$ ) correlated significantly with objective strain whereas tic frequency and complexity showed relatively small and nonsignificant correlations with objective strain ( $r = .17$  and  $r = .14$ , respectively, both  $p$ 's  $> .05$ , see Table 2). For subjective strain, tic number ( $r = .49; p < .01$ ), intensity ( $r = .47; p < .01$ ), and frequency ( $r = .39; p < .05$ ) showed significant correlations whereas tic complexity ( $r = .25, p=ns$ ) and interference ( $r = .22, p=ns$ ) did not (see Table 2).



Interestingly, even within the CTD-only group (i.e., children who did not meet clinical criteria for a comorbid diagnosis), disruptive behavior and symptoms of ADHD (especially inattention) were also significantly related to both objective and subjective strain scores, suggesting that even sub-clinical levels of internalizing and externalizing symptoms are related to caregiver strain in parents of children with CTD (see Table 2).

## Discussion

Studies have shown that many children with CTD experience problems across one or more domains of functioning. Although specific dimensions of tic severity have been shown to predict impairment to some extent, internalizing and externalizing comorbidity is common in CTD and it is often the comorbid symptoms, rather than the tics per se, that are most responsible for functional impairment and reduced quality of life (Storch, et al., 2007; Woods, et al., 2007). Recent research has also begun to emphasize the impact of CTD on primary caregivers, however relatively little research has examined which specific clinical symptoms (e.g., tics versus comorbidity) place the greatest amount of strain on caregivers. To begin to answer this question, the current study examined clinical correlates and predictors of subjective and objective caregiver strain in a large sample of parents caring for children with CTD.

## Summary of Findings

In regard to the objective impact of caring for a child with CTD (e.g., interruption of personal time, missing work, disruption of family routines, financial strain, etc.), the current study found that disruptive behavior, inattention/hyperactivity, and tic intensity were the best predictors of objective strain whereas internalizing symptoms and tic interference, complexity, number, and frequency did not. In addition, parents of children with CTD +comorbidity reported that they experienced more direct interference and disruption stemming from their child's symptoms than did parents of children with CTD-only, and comorbid symptoms showed the strongest correlations with objective strain within this group. These findings are consistent with those of other studies (e.g., Storch et al., 2007) suggesting that parents of children with both CTD and comorbid externalizing problems experience their child's externalizing symptoms as more problematic and disruptive than tics. Our results suggest extend these previous findings, however, and suggest that tics that are particularly forceful and noticeable (i.e., intense) are also likely to be experienced by the parent as more disruptive and problematic than, for example, tics that are frequent but less readily noticed on a moment-to-moment basis. In the absence of comorbidity, however, a different pattern emerged. Within the CTD-only group, several tic severity variables (tic number, intensity, and interference) were strongly correlated with objective strain. However, further emphasizing the potential negative impact of externalizing symptoms on caregivers, however, the current study also found that disruptive behavior and symptoms of ADHD were correlated with objective strain in the CTD-only group, even though these children did not meet clinical criteria for comorbid psychopathology. This suggests that it is important for treatment providers to be aware that both tic and externalizing symptoms may directly burden caregivers, even if comorbid symptoms occur at sub-clinical levels.



With regard to the subjective impact of caring for a child with CTD (e.g., feelings of isolation, anger, worry, stigma, etc.), a combination of ADHD symptoms (inattention/hyperactivity) and tic intensity were the best predictors of subjective strain whereas internalizing problems, disruptive behavior, and tic number, interference, frequency, and complexity did not. When the sample was split into those children with and without comorbid diagnoses, the two groups reported similar levels of subjective caregiver strain, however different patterns emerged for the two groups. For the CTD+comorbidity group, both externalizing symptoms (inattention/hyperactivity and disruptive behavior) and several dimensions of tic severity (tic number, intensity, and complexity) correlated with subjective strain scores, however externalizing symptoms showed much stronger correlations. For the CTD-only group, however, the strongest correlations were found between subjective strain and several dimensions of tic severity (number, frequency, and intensity), suggesting that caring for a child with tics can exert a negative emotional and psychological toll on caregivers, even in the absence of comorbidity. These findings, when considered alongside the aforementioned results related to objective strain, also suggest that tic symptoms may negatively affect caregivers regardless of whether the tics have a direct (objective) impact. For example, parents may worry about the number, complexity, or frequency of their child's tics, even if those dimensions do not directly impact the child or family on a day-to-day basis.

A final unexpected finding of interest was that internalizing scores showed considerably smaller correlations with both subjective and objective strain, in the whole sample and both of the subgroups, than did externalizing symptoms and tic severity. This is surprising given the high rate of internalizing comorbidity in our sample (68.3%) and research showing a relatively strong link between anxiety and impaired family functioning (Cooper, 1996; Langley, Bergman, McCracken, & Piacentini, 2004; Piacentini, Peris, Bergman, Chang, & Jaffer, 2007). While it is possible that internalizing symptoms do not place substantial strain on caregivers, it is conceivable that externalizing symptoms and tics, because they are so readily observed by caregivers, overshadowed the impact of internalizing symptoms and/or that parents misattribute internalizing symptoms (e.g., signs of anxiety and worry) to CTD and/or externalizing problems. Future research is needed to better determine how internalizing symptoms affect children and caregivers with CTD.

### Limitations

The current study has a few limitations that warrant mention. First, the study did not include a healthy comparison group, so the overall level of strain experienced by caregivers of children with CTD, relative to parents of healthy children, remains unknown. However, the overall level of strain reported in both groups within the current sample of CTD is comparable, or only slightly lower, than those reported in previous studies of parents seeking mental health care for children with emotional and/or behavioral disturbances. Second, the current sample represents families enrolled in a clinical trial of a behavioral intervention specifically designed to target (i.e., reduce) tics, introducing a possible selection bias. Third, this study utilized a cross-sectional design and analyses were correlational, so it is not possible to make conclusions about causation. Finally, other variables that may play important roles in predicting caregiver strain were not evaluated. Future research should

examine the unique contribution of other variables, such as psychosocial stress, caregiver psychopathology, and family structure and functioning, in predicting caregiver strain and whether these factors mediate the current findings. This may provide a more thorough understanding of caregiver strain in families managing CTD and could lead to novel or more comprehensive care options.

### Implications for Practice

Despite these limitations, study findings have important implications for health-care providers who work with families managing CTD. Recognizing and helping to reduce caregiver strain could improve the overall wellbeing of both the caregiver and the child. In addition, understanding the variables that best predict caregiver strain may inform intervention efforts by helping providers make decisions about which symptoms to target first and/or how to tailor interventions to the individual needs of both the parent(s) and affected child and family. The complex symptom presentation often observed in CTD, especially when comorbidity is present, can make it difficult for clinicians and patients to come to consensus on which symptoms deserve the most immediate clinical attention. In many cases, it may be that comorbid externalizing symptoms deserve more immediate attention than the tics per se. However, tic intensity also emerged as a predictor of both objective and subjective strain in the current study, suggesting that empirically supported behavioral interventions that are designed to reduce tic severity, such as CBIT (Woods et al., 2008), may have benefits that extend beyond the child, such as reducing caregiver strain.

It is also noteworthy that previous studies have found that augmenting evidence-based psychosocial treatments with techniques to reduce caregiver strain has been associated with better treatment compliance and outcomes (Kazdin & Whitley, 2003). This may be especially important when implementing behavioral interventions, because the caregiver plays a significant role in helping the child to learn and utilize tic- and behavioral-management skills. It may be hard for caregivers to play this role if they are struggling with the demands and responsibilities of caring for a child with complex condition such as CTD.

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**Table 1**

## Demographic and Clinical Characteristics

	Total sample (N=123)	CTD only (N=41)	CTD+comorbidity <sup>a</sup> (N=82)
Age	11.3 (2.4)	11.0 (2.0)	11.5 (2.5)
Gender (% male)	78	76	79
Race (% White)	85	90	82
Mean IQ (SD)	110 (14.0)	113.2 (14.0)	108.4 (13.8)
Tic medication status (% yes)	36	29	39
Other medication status (%yes)	34	20*	42*
Internalizing Comorbidity (Any)	58 (47%)	0	58 (71%)
OCD	23 (19%)	0	23 (28%)
GAD	25 (20%)	0	25 (32%)
Social Phobia	26 (21%)	0	26 (33%)
Separation Anxiety	10 (8%)	0	10 (13%)
Externalizing Comorbidity (Any)	35 (28%)	0	35 (43%)
ADHD	33 (27%)	0	33 (42%)
ODD	9 (7.3%)	0	9 (11%)
Mean Objective Strain Score (SD)	17.7 (8.4)	15.5 (8.1)*	18.8 (8.4)*
Mean Subjective Strain Score (SD)	25.2 (7.3)	23.7 (6.4)	26.0 (7.7)
Mean YGTSS Total Tic Score (SD)	24.6 (6.1)	24.1 (6.7)	24.8 (5.9)
Mean SCARED Score (SD)	13 (9.7)	8.5 (6.3)**	15.2 (10.4)**
Mean DBRS Score (SD)	6.1 (5.0)	3.7 (2.8)**	7.3 (5.4)**
Mean ADHD-RS Total Score (SD)	15 (12.3)	8.0 (5.2)**	18.5 (13.4)**

Note: ADHD-RS = Attention Deficit Hyperactivity Disorder Rating Scale ; CTD = Chronic Tic Disorder; DBRS = Disruptive Behavior Rating Scale; SCARED = Screen for Child Anxiety Related Disorders; SD = Standard Deviation; YGTSS = Yale Global Tic Severity Scale.

\* Subgroups differ at  $p < .05$ ,

\*\* Subgroups differ at  $p < .01$ .

Table 2

## Correlations Between Clinical Variables and Caregiver Strain

Measure	Whole Sample (N=123)		CTD+comorbidity (N=82)		CTD-Only (N=41)	
	Obj. Strain	Sub. Strain	Obj. Strain	Sub. Strain	Obj. Strain	Sub. Strain
DBRS	.49**	.45**	.49**	.47**	.40**	.32*
SCARED Total	.21*	.23*	.18	.16	.12	.33*
Panic	.16	.12	.11	.08	.23	.16
Anxiety	.17	.17	.14	.09	.12	.30*
Separation	.18	.23*	.24*	.24*	-.06	.15
Social	.08	.10	.03	.03	-.02	.22
School	.21*	.21*	.15	.19	.33*	.18
Avoidance						
ADHD-RS Total	.49**	.51**	.52**	.54**	.30	.36*
Hyperactivity	.44**	.48**	.51**	.54**	.05	.05
Inattention	.46**	.46**	.46**	.46**	.34*	.39*
YGTSS Total Tic Score	.24**	.27**	.20	.20	.31*	.43**
Total Number	.38**	.33**	.32**	.27*	.37*	.49**
Total Frequency	.08	.10	.01	-.05	.17	.39*
Total Intensity	.28**	.30**	.22	.24*	.50**	.47**
Total Complexity	.21*	.24**	.21	.22*	.14	.25
Total Interference	.30**	.22*	.17	.17	.49**	.22

Note: ADHD-RS = Attention Deficit Hyperactivity Disorder Rating Scale; DBRS = Disruptive Behavior Rating Scale; SCARED = Screen for Anxiety and Related Disorders; YGTSS = Yale Global Tic Severity Scale (Total Tic Score).

\* p<.05;

\*\* p<.01

**Table 3**

Results of Stepwise Regression Analyses Predicting Objective Strain (Top Panel) and Subjective Strain (Bottom Panel) From Disruptive Behavior (DBRS), ADHD, Anxiety (SCARED), and Tic Severity (YGTSS) for the Total Sample.

Objective Strain	B	SE B	t	p	R <sup>2</sup>
Step 1					
Constant	12.710	1.061	11.979	<.001	
DBRS	.827	.135	.488	<.001	.238
Step 2					
Constant	11.587	1.090	10.633	<.001	
DBRS	.511	.167	3.064	.003	.238
ADHD-RS	.204	.067	3.057	.003	.05
Step 3					
Constant	6.960	2.415	2.882	.005	
DBRS	.453	.167	2.718	.008	.238
ADHD-RS	.218	.066	3.293	.001	.05
Tic Intensity	.899	.420	2.139	.035	.027
Variables Excluded					
SCARED			.092		
Tic Number			-.006		
Tic Interference			-.018		
Tic Frequency			-.050		
Tic Complexity			.060		
Subjective Strain					
Step 1					
Constant	20.743	.908	22.840	<.001	
ADHD-RS	.302	.047	6.445	<.001	.257
Step 2					
Constant	13.986	2.361	6.675	<.001	
ADHD-RS	.301	.045	6.718	<.001	.257
Tic Intensity	1.274	.360	3.542	.001	.071
Variables Excluded					



Objective Strain	B	SE B	t	p	R <sup>2</sup>
SCARED			.105		
DBRS			.175		
Tic Number			.021		
Tic Interference			-.036		
Tic Frequency			-.113		
Tic Complexity			.038		

Note: ADHD-RS = Attention Deficit Hyperactivity Disorder Rating Scale; DBRS = Disruptive Behavior Rating Scale; SCARED = Screen for Anxiety and Related Disorders