Family functioning in pediatric trichotillomania, obsessive compulsive disorder, and healthy comparison youth

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A B S T R A C T

Pediatric trichotillomania (TTM) is an understudied condition that can be highly impairing; little is known about family environmental features that shape its development and course. We examined family functioning among age and gender-matched groups of youth with primary TTM ($n = 30$; mean age = 12.87), obsessive compulsive disorder (OCD; $n = 30$; mean age = 12.70), and no psychiatric history (healthy controls; HC; $n = 30$; mean age = 12.46). An additional group of $n = 25$ TTM cases was employed to examine relationships between TTM severity and family functioning. All youth completed standardized diagnostic assessment, including the Family Environment Scale (FES) and Children's Report of Parenting Behavior Inventory (CRPBI). Family functioning was more impaired among both TTM and OCD cases relative to controls, as evidenced by higher levels of child-reported FES conflict and lower cohesion, expressiveness, and organization. Less consistent findings emerged on parent report, with cohesion, but not conflict, distinguishing the HC and clinical groups. In keeping with prior research, parents of TTM-affected youth also reported lower expressiveness and cohesion than parents in the OCD group. There was limited evidence for links between hair-pulling severity and family impairment and no links to parenting behavior. Findings are discussed in terms of implications for family focused treatment.

Pediatric Hair Pulling Disorder, also referred to as trichotillomania (TTM), is an understudied condition that confers substantial distress and disability to affected youth (Franklin et al., 2008; Woods and Houghton, 2016). The disorder typically begins in childhood, is characterized by repetitive hair pulling resulting in hair loss that persists despite efforts to stop, and leads to impairment in family, social, or other domains of functioning (American Psychiatric Association; APA, 2013). Once thought relatively rare (APA, 2000), there is growing recognition that TTM occurs at a rate that parallels other psychiatric conditions. Indeed, similar to more widely recognized forms of psychiatric illness (e.g., obsessive compulsive disorder; OCD), current estimates of TTM prevalence range from 1.5–2.4% (APA, 2013; Hajcak et al., 2006; King et al., 1995) with more recent work suggesting that these rates may underestimate its occurrence (Houghton et al., 2018). For affected youth, the disorder can bring withdrawal from social activities, low self-esteem, academic impairment, and increased risk for co-occurring psychiatric conditions (Brennan et al., 2017; Franklin et al., 2008; Lewin et al., 2009).

Until recently, TTM was classified as an impulse control disorder alongside conditions such as pathological gambling and kleptomania. This classification emphasized the difficulty resisting or inhibiting harmful urges that are central to the disorder. With the publication of DSM-5 (APA, 2013), TTM was re-classified as an Obsessive Compulsive and Related Disorder based on research demonstrating shared phenomenology and underlying pathophysiology with the other disorders in this category (Cowie et al., 2014). Certainly, some features of TTM closely parallel those observed in OCD: a subset of patients report ritualistic behaviors related to hair pulling (e.g., playing with or eating hair after it is pulled) and a sense of accompanying relief once pulling is complete, features that align with the cycle of obsessions and compulsions. At the same time, TTM is a strikingly heterogeneous condition and many affected individuals are either unaware of their pulling or describe it as pleasurable (Franklin et al., 2008). These complexities, along with a recognition of different types of hair pulling (i.e., focused versus automatic; Flessner et al., 2008), have spurred growing research aimed at elucidating shared versus unique features of these two conditions (Chamberlain et al., 2007; Himle et al., 1995; Lochner et al., 2005; Rozenman et al., 2016).

One area of potential overlap/divergence that may be important for understanding both etiology and treatment is the home environment. Considerable literature documents the disrupted family functioning that surrounds pediatric OCD, including high levels of symptom accommodation, distress, and parenting stress (Hacimeroglu and Karanci, 2014; Ivarsson and Larsson, 2008; Peris et al., 2008a, b;

Piacentini et al., 2003; Storch et al., 2007; Timpano et al., 2010; Turgeon et al., 2002). This work has been particularly useful for improving pediatric OCD treatment, as studies have shown that many of these family factors attenuate response to frontline treatments such as cognitive behavior therapy (CBT; Garcia et al., 2010; Peris et al., 2012; Storch et al., 2010; Turner et al., 2018). Moreover, interventions that directly target these areas of family dysfunction have improved outcomes (Peris et al., 2017a, b). A similar pattern is evident for pediatric anxiety; extensive research (Barmish and Kendall, 2005; Lebowitz et al., 2013; McLeod et al., 2007) documents family dynamics associated with these disorders, and interventions that address them directly have demonstrated encouraging results (Lebowitz et al., 2019; Wood et al., 2006).

By contrast, research on family functioning in TTM is at a much earlier stage of development. Similar to pediatric OCD, TTM is likely to serve as a stressor that elicits a range of complex emotions for parent and child alike. Many parents and children may be unaware that this behavior has a name or that it is potentially indicative of a treatable condition. As a result, parents may view the behavior as a "habit" that needs to be broken or make attributions about controllability and/or personal responsibility for the condition. Alternatively, they may experience distress from observing a persistent behavior that frequently results in prominent bald patches, teasing, shame, and isolation for youth (Franklin et al., 2008). Yet another challenge may come with navigating the condition for youth who find hair pulling gratifying and have little motivation to stop.

Only a handful of prior studies have examined family functioning in pediatric TTM (Murphy and Flessner, 2015). In an early study, Reeve et al. (1992) characterized family functioning in 10 youths with TTM using the Family Environment Scale (FES; Moos and Moos, 1986), noting that parents of TTM youth tended to limit child autonomy and that TTM children described their families as less cohesive and emotionally expressive than their parents (Reeve et al., 1992). A subsequent study (Moore et al., 2009) built upon this work to examine links between family functioning, parental attitudes, and pediatric TTM using a large sample of children and adolescents ($N = 133$; 95% White) who had completed an internet survey on the impact of trichotillomania (Franklin et al., 2008). When referencing normative samples, they found no statistically significant differences in family functioning. However, in keeping with Reeve et al. (1992), higher levels of TTM symptom severity were linked to more difficulty expressing emotions as reported by both parents and children (Moore et al., 2009). Together, these studies provided an important first step in characterizing family dynamics that may shape or maintain TTM. At the same time, the absence of a control condition and lack formal diagnostic assessment undermine interpretation of findings.

Keuthen et al. (2013) addressed these concerns in a study of 49 adolescents with TTM (Mean age = 15.20; 92% White) and 23 matched controls who were systematically assessed using evidence-based procedures (Keuthen et al., 2013). They found that youth with TTM reported higher levels of family dysfunction compared to their unaffected counterparts, particularly in terms of elevated anger and conflict and lower levels of family support. Building on Reeve's findings (Reeve et al., 1992), there was also a trend toward adolescents with TTM being less assertive than their peers without the condition. These findings point to key features of the home environment that may be important for shaping illness over time, and they highlight a potential target of family focused intervention. At the same time, the small sample size and primarily White makeup underscore the need for replication with larger and more diverse groups of youth. Notably, these limitations are not unique to this study, but rather, are emblematic of the vast majority of studies in the area. Most sample sizes are relatively small and include almost exclusively White (i.e., 90% or more; Harrison and Franklin, 2012; Neal-Barnett et al., 2010), underscoring the need for better understanding of how TTM affects people of color.

The pediatric OCD literature offers several suggestions for how TTM and family functioning might be linked. In pediatric OCD, there is evidence for impairment in several domains of family functioning, including symptom accommodation, conflict, cohesion, and parenting behavior (Haciomeroglu and Karanci, 2014; Timpano et al., 2010; Wu et al., 2016). Each of these features has been linked to symptom severity, and some of them (e.g., accommodation) thought to maintain the condition over time. Moreover, features such as conflict and cohesion, have been shown to exert both independent and additive effects on treatment outcome (Peris et al., 2012). For families attempting to manage and contain the burden of disease, high levels of conflict—open expressions of anger—might reflect a tendency toward blame and hostility that heighten stress and affective arousal for all family members (Peris et al., 2008a). Similarly, it is possible that low levels of cohesion—an index of warmth and supportiveness—may make it difficult to problem-solve effectively. Thus, these specific features may have relevance for both OCD and TTM, conditions which can be difficult to understand and challenging to navigate.

This study examines family functioning among a diverse, well characterized group of youth with TTM and matched groups with OCD and with no significant mental health history. Our goals were to understand shared and unique aspects of family functioning in TTM and OCD that might have implications for treatment development. In light of the relatively limited number of pediatric TTM treatment options and high rates of relapse, (Woods and Houghton, 2016) efforts to understand family dynamics that might attenuate or bolster treatment response are important. We hypothesized that (a) family functioning would be impaired in both families of TTM and OCD youth relative to controls, particularly on measures of cohesion and conflict shown to be relevant in prior research with several forms of youth psychopathology (Peris et al., 2015); (b) that family functioning on these particular measures would be worse in TTM than OCD given poorer parental understanding of the condition overall; and (c) that, based on the pediatric TTM literature, families of youth with TTM would be less emotionally expressive relative to either OCD or HC comparison youth (i.e., have more difficulty openly sharing emotions). For exploratory analyses examining links between TTM symptom severity and family functioning, we hypothesized that, in keeping with Moore et al. (2009), worse family functioning, particularly on measures of expressiveness, would be associated with higher levels of hair pulling severity.

1. Method

1.1. Participants

The participants were 30 children and adolescents with a DSM-IV primary diagnosis of TTM (Mean age = 12.87; 90% female) with varied treatment histories; 30 youth with primary OCD (Mean age = 12.70; 90% female) and 30 healthy controls (HC; Mean age = 12.46; 83% female) with no current or lifetime diagnosis of any DSM-IV disorder. Participants were recruited via inquiries to a university-based specialty treatment and research program for pediatric OCD and related disorders. A substantial proportion of the full sample self-identified as racial/ethnic minorities (44%; 20% White Hispanic/Latinx, 9% African American, 9% Asian American, 13% mixed, 4% other), with no significant differences between Caucasian and racial/ethnic minority participants ($\chi^2(2) = 2.25$, $p = .33$). Critically, although rates of comorbidity were on par with what would be expected for these conditions (40%−50%; Peris et al., 2017a, b), no youth in the OCD group also met for TTM, and very few youth in the TTM group ($n = 3$) met for secondary OCD.

An additional sample of youth ($n = 25$) who met diagnostic criteria for current primary TTM were recruited at the TLC Foundation for Body-Focused Repetitive Behaviors national conference in 2014. These youth were comparable to the original 30 youth with TTM in regard to gender and clinical variables (all p's > 0.05), although youth recruited from the conference were slightly older (Mean age = 14.29 years,

SD = 2.33, t = 2.17, p = 04) and a greater proportion (84%; χ^2 (2) = 6.49, p = .03), were Caucasian than the 30 TTM youth recruited from the clinic; they also had prior treatment histories including both medication and psychotherapy. The 55 youth with TTM (30 from laboratory, 25 from TLC conference) were combined for analyses focused only on TTM youth. Finally, HC participants were recruited to the laboratory as a comparison condition. These participants had no history or current mental health problems, no current or history of therapy/counseling or medications, and their primary caregiver(s) also reported no current or history of mental health problems.

1.2. Procedures

The primary sample was comprised of youth and their families who were enrolled in research-based assessment and treatment protocols for pediatric TTM or OCD as well as healthy controls. Although youth came from separate studies, the assessment procedures and supervising of clinical staff were the same. As noted, a separate subset of youth were recruited on-site at the TLC Foundation conference, where they completed a packet of measures and subsequent phone interview during which diagnosis was confirmed with the ADIS and Trichotillomania Diagnostic Interview–Revised to mirror the diagnostic procedures for clinic-recruited youth. For all diagnostic procedures, study staff were trained to criterion via didactics and co-rating following established procedures (Wood et al., 2006). All studies were approved by the university institutional review board and all began by obtaining informed consent/assent.

1.3. Selection of OCD and HC comparisons

OCD youth were matched to the TTM group on age, gender, and global severity for primary disorder, and HC youth were matched to the TTM group on age and gender. This resulted in a final sample of 90: 30 youth with primary TTM, 30 youth with OCD, and 30 HC youth. The overall sample from which the case controls were drawn included 132 youth with primary OCD and 72 controls. To select OCD and control groups comparable in size to the TTM group, the SPSS Case Control Matching procedure was used to match on age and gender for both groups, as well as on primary disorder severity for the OCD group. The criteria used for this procedure included a match tolerance of ± 1 for age and primary disorder severity, and a match tolerance of 0 for gender. Priority was given to exact matches and case order was randomized when selecting from more than one match. To validate, we conducted a second run of the matching procedure, excluding the initially-selected OCD cases. As results did not differ, we kept the first group for use in our analyses.

Secondary analyses examining family functioning only in the TTM group included both the original 30 youth recruited via laboratory research and those participating at the TLC Foundation conference (N for secondary analyses = 55).

1.4. Measures

1.4.1. Anxiety disorders interview schedule-parent/child (ADIS-IV)

The ADIS-IV (Silverman and Albano, 1996) is a clinician-administered semi-structured diagnostic interview that evaluates the presence of major DSM-IV internalizing and externalizing disorders, including anxiety, OCD, and chronic tic disorders. The ADIS has demonstrated good psychometric properties (Silverman et al., 2001; Wood et al., 2002) and was used as part of the clinical intake procedure in the current study. It should be noted that, as the ADIS does not include a section to assess for TTM, supplemental clinical interview (i.e., Trichotillomania Diagnostic Interview) with consideration of DSM-IV criteria was utilized to assign a TTM diagnosis.

1.4.2. Trichotillomania diagnostic interview-revised (TDI-R)

The TDI-R is a semi-structured diagnostic interview based on the TDI (Rothbaum and Ninan, 1994) that assesses TTM diagnosis. The widely used interview evaluates the presence of symptoms corresponding to DSM-IV-TR criteria using a 3-point scale.

1.4.3. Clinician global impression scale-severity (CGI-S)

The CGI-S (Guy, 1976) is a global measure of illness severity that was used to match cases in this study. It asks clinicians to rate the patient's current overall level of symptom severity on a scale of 1to 7, with higher scores indicating greater severity. It is has well established psychometric properties, including construct validity (Peris et al., 2015).

1.4.4. Children's Yale–Brown obsessive compulsive scale (CY-BOCS)

The CY-BOCS (Scahill et al., 1997) is a semi-structured clinician-rated measure consisting of 10 OCD items rated on a 5-point Likert scale. Separate scores are computed for obsessions and compulsions, and a total severity score is determined by summing all 10 items. Higher scores indicate greater severity of obsessive-compulsive symptoms. The CY-BOCS possesses adequate internal consistency and convergent and discriminant validity (Storch et al., 2004).

1.4.5. Trichotillomania scale for children-child/parent version (TSC−C/P)

The TSC−C/P (Tolin et al., 2008) is a 12-item questionnaire measure that evaluates the severity, distress, and impairment associated with hair pulling behavior in youth. Higher scores are indicative of greater hair pulling severity. Developed and validated on a large sample of youth with TTM, the TSC demonstrates acceptable internal consistency, convergent validity, and test-retest reliability (Tolin et al., 2008).

1.4.6. Family environment scale (FES)

The FES (Moos and Moos, 1986) is a 90-item self-report measure designed to assess family functioning across ten domains that broadly capture interpersonal relationships, personal growth, and system maintenance. In this study, we use the following five subscales: cohesion (family commitment and support), expressiveness (direct communication of feelings), conflict (expressed anger and conflict), organization (maintenance of family organization and structure), and control (reliance on rules and procedures to run family life) that fall within the Interpersonal Relationships and System Maintenance Domains given that they have been most closely linked to child psychopathology in the extant literature. Higher subscale scores represent increased display of the construct.

1.4.7. Children's report of parenting behavior inventory (CRPBI)

The revised CRPBI (Margolies and Weintraub, 1977) is a 56-item measure that assesses youth perceptions of their parents' child-rearing behavior across three main domains: Acceptance/Rejection, Psychological Autonomy/Control, Firm/Lax control. Items are answered on a three-point Likert scale, and established psychometric properties. Higher ratings on the Acceptance/Rejection scale indicate greater youth perceptions of parental warmth and appreciation; higher scores on the Psychological Autonomy/Control scale represent greater perceptions of parental encouragement of independence. Higher scores on the Firm/Lax Control scale are indicative of greater use of appropriate discipline practices (Margolies and Weintraub, 1977).

1.5. Statistical analyses

Our primary aim was to compare youth with primary TTM to those with primary OCD and HC on measures of family environment and perceptions of parenting behavior. Two one-way multivariate analysis of variance tests (MANOVAs) and two-tailed tests of significance were conducted with the five FES and three CRPBI subscales as outcomes.

Table 1
Demographic and clinical characteristics by group.

	TTM	OCD	Control
N	30	30	30
Gender (% female)	90%	90%	83%
Racial/ethnic minority (%)	50%	33%	50%
Mean age (years)	12.87 (2.46)	12.70 (2.59)	12.46 (2.36)
CGI-Severity*	4.40 (0.93)	4.83 (0.70)	1.00 (0.00)
# Comorbid diagnoses	0.87 (1.04)	1.07 (1.20)	—

  * As would be expected, the control group had significantly lower CGI-Severity than TTM and OCD groups.

Follow-up tests of simple effects for those analyses in which overall group differences emerged were conducted. Bonferroni correction was used within each overall MANOVAs and follow-up tests to control for multiple comparisons. Age, minority status, and comorbidity were tested as potential covariates in models; none were significant and they were excluded from final results. In addition, three youth in the TTM group met for co-occurring non-primary OCD diagnoses. We also ran analyses without these participants, without substantive changes to the findings; therefore, we included these youth in our analyses.

    Our secondary aim was to examine potential links between symptom severity and family functioning in the full TTM group. The original sample ($n = 30$) was combined with another sample of youth who reported current TTM symptoms ($n = 25$), described above. Exploratory correlations were run between significant outcomes from Aim 1 with youth age, TTM symptoms, CGI-Severity, and number of comorbid diagnoses.

2. Results

    Table 1 provides demographic and clinical information by group. As youth in the OCD and HC groups were matched to the TTM group on age and gender, we did not anticipate (nor did we find) group differences on those variables. There were also no significant group differences on ethnic/racial minority status (coded as a dichotomous variable). As would be expected, youth in the HC group had significantly lower CGI-Severity scores than youth in the two diagnostic groups ($F(2,87) = 292.19$, $p < .001$). The TTM and OCD groups did not differ from one another (Mean difference = 0.34, $p = .52$), suggesting that the case matching procedure was successful. Finally, the TTM and OCD groups did not differ on total number of comorbid diagnoses ($F(1,58) = 0.48$, $p = .50$; See Table 2).

2.1. Family environment

    We found significant overall group differences in youth-reported

Table 2
Percent comorbid diagnoses in TTM and OCD groups*.

	TTM	OCD
No comorbid diagnoses	50%	40%
TTM	—	0%
OCD	10%	—
Chronic tic disorder/tourette	0%	13%
Separation anxiety disorder	7%	17%
Social phobia	17%	7%
Generalized anxiety	27%	17%
Depressive disorder	10%	20%
ADHD	20%	23%
Oppositional defiant disorder	3%	10%
Conduct disorder	0%	0%

  * Note that some youths met for more than one diagnosis; as such, numbers may not add up to 100% when summing percentage of youth meeting for specific diagnoses and those meeting for no diagnoses.

Table 3
Group comparisons for FES subscales: Means (SD) and group differences.

	TTM	OCD	Control
Youth FES subscales			
Cohesion	4.10 (2.12)[b,c]	5.60 (2.61)[a,c]	7.17 (2.05)[a,b]
Expressiveness	3.97 (1.45)[c]	4.47 (1.55)	5.13 (1.33)[a]
Conflict	4.77 (2.14)[c]	4.67 (1.99)[c]	6.97 (2.15)[a,b]
Organization	4.20 (2.17)[c]	4.53 (2.10)[b]	6.37 (2.30)[a,b]
Control	3.67 (1.65)	4.30 (2.29)	4.27 (1.55)
Parent FES subscales			
Cohesion	4.37 (2.22)[b,c]	6.07 (2.27)[a]	7.00 (1.78)[a]
Expressiveness	4.50 (1.89)[b]	5.63 (1.65)[a]	5.60 (1.73)
Conflict	6.07 (1.68)	5.00 (2.29)	5.13 (2.60)
Organization	5.03 (1.99)	5.20 (2.09)	5.73 (1.96)
Control	4.50 (1.83)	4.03 (2.08)	5.73 (1.96)

Note: Healthy control youth served as the reference group for all group comparisons. Higher values for FES subscales indicate higher self-reports for that construct (e.g., higher values for cohesion indicate greater cohesion, whereas higher values for conflict indicate more conflict).
  [a] Significantly different from TTM.
  [b] Significantly different from OCD.
  [c] Significantly from healthy control.

FES subscales of cohesion [$F(2, 87) = 13.68$, $p < 0.001$], expressiveness [$F(2, 87) = 4.92$, $p = 0.009$], conflict [$F(2, 87) = 10.56$, $p < 0.001$], and organization [$F(2, 87) = 8.51$, $p < 0.001$], as well as parent-reported cohesion [$F(2, 87) = 12.09$, $p < 0.001$] and expressiveness [$F(2, 87) = 4.03$, $p = 0.02$]. Follow-up pairwise comparisons revealed that the HC group self-reported significantly higher cohesion and organization, and lower conflict than TTM and OCD, with comparable scores between the clinical groups. HC youth also reported higher expressiveness than TTM youth. Parents of youth in the OCD and HC groups reported higher cohesion than TTM youth, with comparable parent-reported cohesion between OCD and control groups. Finally, parents of OCD youth reported higher expressiveness than those in the TTM group (see Table 3).

2.2. Perceptions of parenting behavior

    We did not find any significant group differences in youth- or parent-reported perceptions of parenting behavior (CRPBI subscales; overall multivariate test $F(18, 156) = 1.40$, $p = .14$).

2.2.1. Family functioning as a correlate of symptom severity within TTM group

    To follow up on our primary aim, we conducted post-hoc analyses for the combined TTM group ($n = 55$) in order to explore whether FES subscales were associated with demographic (age) and clinical (CGI-Severity, number of comorbid diagnoses, and youth and parent ratings on the TSC).

    As shown in Table 4, parent and youth ratings of TTM symptoms were highly and significantly correlated with each other, as well as with CGI-Severity and comorbidity. Some youth- and parent-reported FES subscales were also correlated with one another, although correlations were stronger and more consistent across parent-reported subscales. Youth age was positively correlated with youth-reported parental control ($r = 0.32$, $p = .02$) and negatively correlated with youth-reported familial organization ($r = -0.37$, $p = .006$). However, broadly, we did not find significant correlations between FES subscales and our clinical measures, with the exception of a positive correlation between CGI-S and FES-P organization ($r = 0.38$, $p = .04$), and a negative correlation between number of comorbid diagnoses and FES-C expressiveness ($r = -0.53$, $p = .003$).

Table 4
Correlations between TTM symptoms and severity, comorbidity, and family environment.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Age	—													
2. TSC-C	.16	—												
3. TSC-P	.21	−0.33*	—											
4. CGI-S	.21	**.40***	**.44***	—										
5. # Comorbid diagnoses	.21	.30	**.44***	**.45***	—									
FES-C														
6. Cohesion	.11	−0.12	**.38***	.17	−0.32	—								
7. Expressiveness	.19	.05	−0.03	.01	**−0.53****	**.40****	—							
8. Conflict	−0.15	−0.01	.08	−0.16	−0.34	.08	.04	—						
9. Organization	**−0.37****	−0.02	.01	−0.23	−0.28	**.32***	−0.10	**.42****	—					
10. Control	**.32***	.08	−0.22	−0.34	−0.29	.09	.20	.00	.12	—				
FES-P														
11. Cohesion	.09	.07	−0.04	.33	.08	**.55*****	.21	.00	.24	.18	—			
12. Expressiveness	−0.02	.09	.08	.33	−0.07	**.48*****	.20	.18	**.33***	−0.12	**.63*****	—		
13. Conflict	−0.14	.09	.11	.00	−0.01	.22	.00	.12	.26	−0.08	**.30***	.24	—	
14. Organization	−0.10	−0.05	−0.02	**.38***	.00	.25	−0.05	.05	**.46*****	.03	**.49*****	**.32***	**.27***	—
15. Control	−0.02	−0.14	−0.06	−0.26	−0.13	−0.11	.13	.11	.04	.06	.11	.07	.26	.10

TSC−C = Trichotillomania Scale for Children – Child Version; TSC-P = Trichotillomania Scale for Children – Parent Version; CGI-S = Clinical Global Impressions – Severity; FES = Family Environment Scale.

* $p < .05$.
** $p < .01$.
*** $p < .001$.

3. Discussion

This study examined family functioning among youth with TTM, OCD, and no mental health history in an effort to improve understanding of the dynamics surrounding pediatric TTM. Compared to HC youth, TTM youth reported poorer family environment, but not poorer perceptions of parenting behavior. On youth self-report measures, we found strong support for the hypothesis that family functioning would be more impaired among both TTM and OCD cases relative to controls, a finding that extended beyond our two primary domains of conflict and cohesion to also include expressiveness and organization as measured by the FES; less consistent findings emerged on parent report, with cohesion, but not conflict, distinguishing the HC and clinical groups. There was partial support for the hypothesis that family functioning would be worse in TTM versus OCD; this pattern held for cohesion but not conflict. As expected, youth with TTM reported lower levels of family expressiveness than HC youth. Finally, counter to expectations, there was limited evidence for links between TTM severity and the degree of family impairment on the FES; there were also no links between TTM and parenting behavior as measured via CRPBI.

Together, these findings build on an emerging body of literature on family functioning in pediatric TTM. Given that families are central to both child development in general and to successful treatment in particular, understanding of family dynamics that may shape or maintain TTM is crucial. Across numerous forms of child and adolescent psychopathology, family conflict and cohesion emerged as important correlates of illness (Ogburn et al., 2010; Shalev et al., 2008; Sheidow et al., 2014; Sullivan and Miklowitz, 2010; Thompson-Hollands et al., 2015) and predictors of outcome (Birmaher et al., 2000; Ginsburg et al., 2014; Sullivan et al., 2012). In pediatric OCD in particular, these family features have been shown to attenuate response to exposure based CBT with additive effects as functioning in these two domains worsens (Peris et al., 2012). Thus, it is not all that surprising that youth in both clinical groups in this study appeared to exhibit worse family functioning on these variables relative to their HC counterparts.

What is perhaps more striking is that both TTM youth and their parents reported worse family cohesion relative to their peers with OCD. Cohesion is conceptualized as an index of warmth and supportiveness among family members. For those facing the stress of psychiatric illness, it may be a particularly important factor that allows family members to work together to solve the challenges it brings. In this study, TTM youth were more than a standard deviation below their HC counterparts, and significantly below their OCD peers as well, a finding that underscores the strain of managing TTM. For affected youth, difficulty inhibiting urges to pull may lead to feelings of shame and isolation that make it difficult to feel connected to parents (Glazier and Wetterneck, 2015). Further, co-occurring anxiety, depression, and disruptive behavior disorders, common in youth with TTM, may exacerbate family problems (Harrison and Franklin, 2012). For caregivers, difficulty understanding the condition or knowing how to respond may lead to strategies that are perceived as unsupportive or unhelpful.

Findings from this study also highlight the importance of family expressiveness in pediatric TTM. Although only a handful of studies exist, each provides some indication that family members' ability to express emotions effectively may suffer in TTM (Keuthen et al., 2013; Moore et al., 2009; Reeve et al., 1992). For youth with TTM, this may reflect difficulty asserting themselves and speaking up to share their difficult emotions. As parents are key socializers of emotional expression (Cole and Jacobs, 2018), these difficulties may reflect a similar tendency in caregivers who model less direct expression of emotion. Although our cross-sectional design cannot disentangle the direction of effects, which are likely to be bidirectional, these findings highlight an area in need of further research, and, potentially, an area ripe for family intervention.

We failed to replicate the finding of Moore et al. (2009) linking symptom severity to any of our measures of family functioning. This may be due in part to methodological differences in approach (e.g., survey versus in-person assessment). It may also be the case that the presence of a BFRB is itself a stressor, but that the frequency and severity of the behavior matter less once it is occurring. Alternatively, our findings may be partially attributed to discrepancies between the state (i.e., waxing and waning) nature of hair pulling (Park et al., 2012) in contrast to the relatively stable nature of family dysfunction (Davies et al., 2006). Given that family functioning is often closely linked to symptom severity in other youth mental health conditions (Hughes et al., 2008; Sheeber et al., 1997; Storch et al., 2007), this finding merits further study.

The present findings should be interpreted in light of limitations. First, this cross-sectional study cannot determine the direction of effects between TTM and family functioning. Second, the majority of cases

were recruited via inquiries to a university-based specialty treatment program and therefore may not reflect the population at large. Notably, evidence-based treatment options for pediatric TTM remain very limited and few providers exist in even in well-resourced metropolitan areas (Woods and Houghton, 2016) which can make such specialty programs the only viable treatment option for affected youth. Finally, despite use of research-based *a priori* hypotheses, statistical correction, and a large sample relative to other studies of TTM youth, we may have been underpowered to detect differences. Replication with a larger sample would allow for increased confidence of sufficiently powered post hoc analyses that might further clarify how problems in family dynamics may be similar vs. distinct in TTM and OCD. In addition, future research should employ longitudinal designs to consider the bi-directional, developmental processes that link family functioning and TTM. It might also benefit from consideration of how TTM compared to other frequently linked conditions, including Tourette Syndrome.

Nevertheless, the present study offers an important step forward in understanding the family dynamics associated with pediatric TTM. It points to conflict and cohesion as key areas of impairment that may overlap with those seen in pediatric OCD, a finding which potentially opens the door to evidence-based treatment strategies that have proven effective for targeting those aspects of family functioning (Peris et al., 2013; Peris et al., 2017a, b). These treatments have targeted emotion regulation and collaborative family problem solving in the service of supporting the child's individual work in treatment. The present findings also suggest that poor family cohesion may be particularly problematic in TTM, requiring particular attention to this dynamic perhaps through activities that bolster warmth, supportiveness, and positivity among family members. Further, the present findings point to the potentially unique role of family expressiveness in pediatric TTM, providing a valuable avenue of further research that might inform family-focused intervention with the disorder. Such work might profit from exploring strategies for helping family members to express emotions and needs in constructive, adaptive fashion, perhaps borrowing from established communication skills training techniques that have proven successful with other disorders (Miklowitz et al., 2008).

Declaration of Competing Interest

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