ORIGINAL ARTICLE

Maternal and Child Expressed Emotion as Predictors of Treatment Response in Pediatric Obsessive–Compulsive Disorder

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Abstract Expressed emotion (EE) is associated with symptoms and treatment outcome in various disorders. Few studies have examined EE in pediatric OCD and none of these has assessed the child's perspective. This study examined the relationship among maternal and child EE, child OCD severity, and OCD-related functioning pre- and post-treatment. At pre-treatment, mothers completed speech samples about the child with OCD and an unaffected sibling. Children with OCD completed speech samples about parents. There were low rates of high maternal EE (child with OCD: 16.1%; sibling: 2.6%) and high child EE about parents (mothers: 11.9%; fathers: 10.2%). High EE was primarily characterized by high criticism, not high overinvolvement. High maternal EE and child EE regarding fathers were associated with pre-treatment child OCD severity but not post-treatment severity. High child and maternal EE were predictive of post-treatment OCD-related functioning. EE may be an important child and maternal trait associated with pre-treatment OCD severity and generalization of treatment gains.

Keywords Expressed emotion · Obsessive–compulsive disorder · OCD · Family · Treatment

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Familial characteristics may impact the development, maintenance, and treatment of childhood psychiatric disorders, including anxiety disorders [1]. One index of family environment is expressed emotion (EE), a measure of emotions and attitudes expressed by one individual toward another [2]. High EE is characterized by high emotional overinvolvement (EOI), criticism (CRIT), or hostility [3]. High EOI is indicated when a parent describes extreme self-sacrificing behavior or overprotection, has a lack of objectivity or becomes very emotional when talking about the patient. High CRIT is indicated when negative comments are made about the patient, the relationship is described in a negative manner, or dissatisfaction with the patient is expressed.

High parental EE is associated with the persistence and severity of symptoms and poorer treatment response in children with various psychological disorders [4–6]. However, little research has examined EE in child OCD. EE may be particularly important in child OCD given that family relationships are theorized to contribute to the development and maintenance of anxiety and families are affected by child OCD symptoms.

Models of OCD have emphasized the potential contributions of parental criticism and overprotection to the development and maintenance of OC symptoms. Salkovskis et al. [7] suggested that critical and overprotective parenting may foster the child's development of an inflated sense of responsibility, which may maintain compulsive symptoms. Rachman and Hodgson [8] suggested that parental overprotection may increase child anxiety and dependence on parents and parental criticism may lead children to fear making errors, thereby leading to checking behaviors.

Familial responses to child OCD vary from participation in rituals to criticism of the child for ritualizing [9], both of which may maintain or worsen the severity of OCD symptoms [10]. These family responses are highly related constructs to those examined by EE [11]; therefore, the study of EE in pediatric OCD may be particularly relevant.

Parental criticism and overprotection are related to child anxiety symptoms in disorders other than OCD [12, 13]. However, few studies have examined EE or the components of EE in OCD. Chambless and Steketee [14] examined EE in relatives of treatment-seeking adults with OCD or panic disorder and found high rates of EE. Fifty-five percent of speech samples were categorized as high EE (40% high CRIT, 33% hostile, and 12% high EOI). However, this was an adult study and EE was assessed largely via spousal interviews. Differing results may be found when studying EE regarding a child with OCD.

Several studies of EE in children with OCD have been conducted by Hibbs et al. [15–17], all of which used parent five minute speech samples (FMSS) [18] to assess EE in parents of children with OCD and parents of children unaffected by psychological disorders. In the FMSS parents talk for 5 min about the child and how they get along with the child [18]. The results of these studies indicated that 46–47% of fathers and 71–74% of mothers of children with OCD had high EE, compared to 24–31% of fathers and 13–22% of mothers of children with no clinical disorders [15–17]. It was concluded that EE is associated with child OCD.

As reviewed earlier, high CRIT and/or EOI may maintain anxiety symptoms, thereby impacting treatment efficacy. This may especially be the case with children, who are more dependent on family for the implementation of therapy techniques. Thus, it is especially important to examine EE as a predictor of outcome in psychotherapy for children.

High EE predicts worse post-treatment symptom severity and higher dropout rates in behavior therapy in adult OCD [14]. Only one study has explored EE and treatment outcome in pediatric OCD [19]. This study examined whether EE predicted global functioning 2- to 7-years after the completion of a trial of clomipramine. High pre-treatment EE predicted worse global functioning at follow-up [19]. However, no studies have examined

whether pre-treatment EE predicts child outcome in response to psychosocial treatment, such as cognitive-behavioral therapy (CBT). EE may be especially relevant as a predictor of psychosocial treatment because it may impede the child's implementation of therapy techniques within the home.

Extent studies have not examined the components of high EE–CRIT and EOI; therefore, it is difficult to know the relative contributions of each to the prediction of outcome. CRIT is concordant with observable parental behaviors [20, 21] and is thought to be appropriate to child samples. In contrast, low rates of EOI have been found in speech samples about children [22] and EOI is not concordant with parent behaviors [20, 21] leading some to question whether EOI, as measured by EE, is applicable to children.

EOI is indicated by the presence of self-sacrificing behaviors, overprotection, expressing strong feelings of love towards the child, and willingness to do anything for the child, all of which may be developmentally appropriate for a parent of a child [22]. Thus, it may be important to examine the components of EE when studying child samples. Further, studies have not addressed whether EE is specific to the relationship with a particular child or is a characteristic of the general home environment.

Controversy exists regarding this topic. EE has been primarily conceptualized as a trait, specific to a parent or a home environment [2], wherein intolerance of patient difficulties, parent intrusiveness, and inflexibility are present. In support of this, EE has been demonstrated to have high stability over time in adults [23] and moderate stability over time in relatives of children [24].

However, EE has also been conceptualized as a state variable specific to a relative's relationship with one individual at a particular time rather than a characteristic of a parent of the home environment. For example, high EE may be present in the relationship with an individual with a psychological disorder due to the stress of the individual's illness or to beliefs that the individual should be able to control their symptoms. Studies have found higher rates of EE when a parent talks about an individual with schizophrenia versus an unaffected sibling [25] and when a parent talks about a child with epilepsy versus an unaffected sibling [26]. To date, no pediatric OCD studies have examined whether EE is a consistent parental trait, as indicated by concordance among maternal EE samples about different children, or is specific to a particular parent–child relationship.

If EE is specific to attributions, members of the same dyad could differ in EE status. Reporters are often inconsistent in their perspectives on family functioning [27]. Children's perception of the parent–child relationship may be more important in child development than objective views [28], and may play a role in the etiology and maintenance of child anxiety disorders [29]. Further, parents of children with anxiety disorders may minimize family difficulties; [30] therefore, it may be important to assess child perceptions. Studies examining parenting and parent–child relationships have relied on child report in children as young as seven [31, 32] and child report has been corroborated with observational data [29]. Therefore, child EE speech samples may provide a rich source of data.

High child EE could be indicated by a child expressing criticism of a parent or describing a role-reversed relationship in which the child is sacrificing for, or protective of the parent. Role-reversal has been retrospectively reported by anxious adults [33].

Only one study has examined child EE speech samples [34]. This study examined child speech samples about each parent and parent speech samples about the child in children (ages 6–12) with ADHD with and without aggressiveness. There were no differences between the two groups in rates of high EE in child or parent speech samples. High EE in parent speech samples was associated with parents' verbal coercive and negative affective behaviors in an interaction task but children's coercive and prosocial behaviors were not

correlated with their speech samples. Finally, there was good consistency among child and parental speech samples. Despite these promising findings, this is the only study that has examined child speech samples. It is unclear what the frequency of high EE would be in child EE speech samples in children with OCD.

In summary, extent studies on EE in child OCD have not examined (a) concordance between maternal report of EE about a child with OCD versus a sibling in order to examine whether EE is a trait or specific to a relationship, (b) child speech samples about parents or the agreement between child's speech samples about each parent, (c) the components of EE, EOI and CRIT, as predictors of outcome in response to psychotherapy. The current study aims to extend EE research by examining these topics.

We hypothesized that: (1) EE will be predominantly indicated by high CRIT, not high EOI because this concept may not apply to children. (2)There will be higher rates of high maternal CRIT about a child with OCD relative to an unaffected sibling, thereby supporting the state view of EE. We expect no difference in rates of EOI between speech samples about the child with OCD and an unaffected sibling because the rates of EOI will be so low. (3) High maternal CRIT will be associated with worse pre-treatment OCD-related functioning and severity but high EOI will not be associated with worse pre-treatment OCD-related functioning and severity because it will be so infrequent of an occurrence. (4) High maternal CRIT will also be associated with worse post-treatment OCD-related functioning and severity, but high EOI will not be associated with post-treatment functioning or severity due to the infrequency of the occurrence of high EOI. Child EE analyses are being conducted on an exploratory basis due to the small literature relying on child EE speech samples.

Method

Participants

Participants were 62 mother–child dyads who were a subset of participants in a treatment outcome study [35].[1] All children (ages 7–17) were diagnosed with primary OCD and excluded if they: met criteria for primary DSM-IV [36] Axis I disorders other than OCD; had a history of organic brain disorder, schizophrenia, pervasive developmental disorders, or bipolar disorder; were suicidal; had two previous failed medication trials or a failed trial of CBT for OCD; had an intolerance to sertraline; were pregnant; or had concurrent treatment. The sample was 93.5% Caucasian, 50% male, and had a mean age of 11.7 years (SD = 2.64). Seventy-three percent of the sample lived with both parents, 20.6% with mothers, 1.6% with fathers, and 1.6% with a guardian other than a mother or father. No further data was provided about these guardians. Data was not present on 3.2% of the sample. No children were adopted.

Measures

Interview and Self-Report Measures

Anxiety disorders interview schedule for DSM-IV: Child version (ADIS-C-IV) [37]. The ADIS-C-IV primarily assesses DSM-IV anxiety disorders, but also assesses affective

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[1] The larger trial consisted of 112 patients, 97 of whom completed treatment. This subsample was recruited by order of entry into the larger study. Analyses indicated that the current subsample did not differ from the larger trial on demographics.

disorders, externalizing disorders, and substance abuse in children (ages 6–17). Parent and child versions were combined to form one interview, which was administered to provide a diagnosis of OCD and determine eligibility for the larger treatment trial. The ADIS-C-IV has good reliability, validity and sensitivity to treatment effects [38–40]. Assessors were trained to diagnostic reliability using the ADIS-C-IV [41]. Twenty percent of pre-treatment interviews were rated by an independent rater (kappa = .88, $p < .001$).

Child-version yale brown obsessive compulsive scale (CY-BOCs) [42]. The CY-BOCS is a 10-item clinician-rated instrument, which assesses OCD severity and merges data from clinical observation, parent and child report. Items are rated on 0–4 scales. Total scores range from 0 to 40 (0–7: subclinical; 8–15: mild; 16–23: moderate; 24–31: severe; 32–40: extreme). The CY-BOCS has good interrater reliability, validity and internal consistency ($\alpha = .87$) and is sensitive to treatment change [42]. Assessors were trained to reliability through joint interviews and videotape reviews. An independent rater rated 20% of CY-BOCS interviews. Inter-rater reliability was acceptable ($r = .81$, $p < .001$).

Child obsessive–compulsive impact scale (COIS) [43]. The COIS is a questionnaire that assesses functional impairment associated with having OCD [44]. The COIS contains parent and child versions consisting of a total scale and 3 subscales: school, social, and home/family functioning. Items are rated for the past month on a four-point scale ranging from 0 (*not at all*) to 3 (*very much*). Higher scores indicate worse functional impairment. The COIS has good external validity and correlates highly with measures of OCD severity and children's global assessment scale scores [43]. The COIS is sensitive to treatment change [45]. In the current study, both the parent and child versions were used.

Five-Minute Speech Sample (FMSS) [18, 46]

The FMSS is a measure of criticism and overinvolvement derived from the Camberwell family interview (CFI). During the FMSS, relatives are asked to speak about their child and how they get along [46]. Once the speech sample started, the interviewer did not answer questions and avoided eye contact with the respondent. Should the respondent fall silent during the speech sample, the interviewer waited for 30 s of silence and prompted the respondent by saying, "Please tell me anything about (name of child) for a few minutes." In the present study, EE speech samples from the maternal caregiver were obtained during a pre-treatment assessment. The maternal caregiver was also asked to identify the closest age-matched sibling who was unaffected by OCD and to provide an EE speech sample about this child. In families in which the child with OCD was the sole child, the parent completed only one speech sample ($n = 24$). The FMSS has concurrent validity with the CFI [18] and reliability over 3- to 5-weeks [47, 48].

Two-Minute Speech Sample (TMSS) [34]

The TMSS is a child EE speech sample derived from the FMSS and uses the same standardized instructions. Children were asked to speak about each parent and how the child gets along with him/her. If a child was not living with biological parents, speech samples were given about male and female guardians with whom the child had lived for at least 2 years. All children gave speech samples about both a male and female guardian.

Consistent with Marshall and colleagues [34], the FMSS and TMSS were coded according to standardized coding [46]. Standardized coding consists of (1) coding the initial statement in a speech sample as being negative, neutral, or positive, (2) counting the number of critical remarks, positive remarks, and expressions of strong feeling of love for

the relative, (3) global coding about the presence or absence of expressions of dissatisfaction, emotional displays, self-sacrificing/overprotective behavior, and excessive detail about the past in the speech sample.

High CRIT was indicated by a: (a) negative initial statement, (b) negative description of the relationship, or (c) a criticism of the relative. High EOI was indicated by: (a) self-sacrificing or overprotective behavior, (b) an emotional display, or (c) any two of the following: excessive detail about the past, expressing strong feelings of love for the relative, willingness to do anything for the relative, or five or more positive remarks. A high EE rating was assigned if high CRIT or EOI was present. When subthreshold CRIT/EOI was present, borderline EE was assigned. A low EE rating was given if neither high nor borderline CRIT/EOI was present. Borderline ratings can be useful in drawing a distinction between the presence of some CRIT or EOI and the presence of no CRIT or EOI (a true low EE rating); therefore, percentages of high, borderline, and low EE rates are presented in Tables 1 and 2. However, consistent with the FMSS manual [46], when examining EE as a predictor, those with borderline EOI and/or CRIT were considered low EE.

Two raters (AP and LAZ) were trained to reliability by Dr. Euthymia Hibbs using standardized instructions, examples, and group, and individual ratings. Following training, all ratings were made independently. An additional rater coded 30% of tapes for reliability. Inter-rater reliability was acceptable for maternal (child with OCD, $K = .77$, sibling, $K = 1.00$) and child EE (regarding mother, $K = .64$; regarding father, $K = .64$). Kappas were similar for CRIT (maternal: child with OCD, $K = .77$, sibling, $K = 1.00$; child: mother, $K = .64$; father, $K = .64$), but could not be calculated for EOI due to the small number of high ratings.

Table 1 EE in maternal speech samples

	Child with OCD			Age-matched sibling		
	% High	% Borderline	% Low	% High	% Borderline	% Low
Overall EE	7.9	47.4	44.7	2.6	23.7	73.7
CRIT	7.9	36.8	55.3	2.6	15.8	81.6
EOI	0	18.4	81.6	0	7.9	92.1

The rates above are for mothers who gave EE speech samples about both the child with OCD and an age-match sibling; therefore, it is a subsample of the overall sample. When examining the full sample of mothers who gave EE speech samples about their child with OCD the rates were as follows: Overall EE: 16.1% high EE, 40.3% borderline, 43.5% low; CRIT: 11.3% high, 35.5% borderline, 53.2% low; EOI: 4.8% high, 11.3% borderline, 83.9% low. All individuals who gave EE speech samples about an age-matched sibling gave EE speech samples about the child with OCD; therefore the rates above are reflective of the full sample of EE speech samples about siblings

Table 2 EE in child speech samples

	About mother			About father		
	% High	% Borderline	% Low	% High	% Borderline	% Low
Overall EE	12.1	25.9	62.1	10.3	20.7	69
CRIT	12.1	15.5	72.4	10.3	17.2	72.4
EOI	0	10.3	89.7	0	5.2	94.8

Overall Fisher's = .782. CRIT Fisher's = 1.0. EOI Fisher's = .49

Procedures

Prior to treatment, mothers completed the FMSS about their child with OCD and closest age-matched sibling without OCD, with order counterbalanced. Children with OCD completed speech samples about their mother and father or female/male guardians, with order counterbalanced. Speech samples were videotaped and coded at a later date.

Participants were randomly assigned to CBT, sertraline, combined CBT and sertraline, or pill placebo for 12 weeks [35]. Those assigned to sertraline or pill placebo met with a psychiatrist who monitored clinical status and medication effects weekly for the first 6 weeks and biweekly for the last 6 weeks. CBT consisted of 14 visits of psychoeducation, cognitive training, creation of a hierarchy, exposure and response prevention. Those in the combined condition completed CBT visits and psychiatrist appointments.

At post-treatment, the CY-BOCS was administered to all participants by an assessor blind to treatment status. Parents and children also completed the COIS at post-treatment.

Results

Statistical Plan

Percentages of maternal and child speech samples were calculated for high EE, CRIT and EOI. High, borderline, and low EE ratings were calculated to examine the percentage of individuals whose speech samples met standard criteria for high EE, had some characteristics of high EE without meeting full criteria for high EE (borderline EE), and had no criteria for high EE (low EE).

Because of the low N in some cells, Fisher's exact tests [49] were used to compare rates of maternal EE about the child with OCD and sibling. To determine whether mothers and children have similar perceptions, the concordance between maternal and child EE was calculated using the kappa statistic. Concordance between child EE regarding mothers and fathers was calculated to determine whether EE is a child trait.

To explore the relationship between high CRIT (maternal and child) and pre-treatment OCD severity, those with high CRIT were compared to those without on pre-treatment OCD severity and functional impairment. Three ANOVAs were conducted to examine whether those who had high CRIT (maternal, child about mothers, child about fathers) had higher CYBOCS pre-therapy scores. MANOVAs were conducted to examine whether those with high CRIT had differences in child-reported functional impairment and parent-reported functional impairment. No analyses were conducted to examine differences in those with high EOI because rates of high EOI were low.

A series of hierarchical simultaneous regressions were conducted with high CRIT and EOI (maternal and child about mother and father) predicting post-treatment CYBOCS and COIS scores for the intent-to-treat sample. To control for pre-treatment OCD severity and functioning and potential treatment differences, pre-treatment scores for the dependent variable were entered in Step 1 and treatment modality was entered in Step 2. Treatment modality was coded as receiving sertraline, 0 (*no*) 1 (*yes*), and receiving CBT 0 (*no*) 1 (*yes*). In Step 3, pre-treatment maternal CRIT and EOI and child CRIT about mothers and fathers were simultaneously entered into the equation in order to examine the variance attributable to each of these variables (above and beyond those entered on Steps 1 and 2). Pre-treatment CRIT and EOI were entered as dichotomous variables (high vs borderline/low). Key dependent variables were post-treatment OCD severity and child- and

parent-reported OCD-related functioning. A Holm Step down procedure was used on Step 3 of the regression equations to control for multiple tests.

Findings

Hypothesis 1 EE will be predominantly indicated by high CRIT, not high EOI.

Rates of low, high, and borderline EE, EOI, and CRIT are presented for maternal speech samples and child speech samples in Tables 1 and 2 respectively. Rates of high EE were relatively low and primary driven by CRIT. There were very low rates of high EOI in maternal speech samples and none in child speech samples.

Hypothesis 2 There will be higher rates of high maternal CRIT (but not EOI) about a child with OCD relative to an unaffected sibling

Rates of overall EE differed between speech samples about children with OCD and age-matched siblings (Fisher's Exact Test, $p = .03$), as did rates of CRIT (Fisher's Exact Test, $p = .04$). There were higher rates of high and borderline EE and CRIT about children with OCD relative to age-matched siblings. However, rates of EOI did differ across the children with OCD and age-matched siblings (Fisher's Exact Test, $p = .35$).

Concordance Among Maternal EE and Child EE About Mother and Father

Consistent with correlations among variables, which indicate a moderate association (see Table 4), child EE about mothers and maternal EE were concordant ($K = .315, p < .001$). When maternal EE about the child with OCD was categorized as low EE, the majority (84.0%) of child samples about mothers were low EE and the remaining were borderline. When maternal EE about the child with OCD was borderline, 52% of child samples about mothers were categorized as low EE, 36% were borderline, and 12% were high. When maternal EE about the child with OCD was categorized as high EE, 50% were high, and the rest were split evenly between borderline and low. This is consistent with previous research [34], suggesting that child and maternal views of their relationship overlap and provides support for the trait model of EE.

Child EE about mothers and fathers were concordant ($K = .39, p < .001$). When child EE samples about mothers were categorized as low EE, 86.5% of those about fathers were also low and 13.5% were borderline. When child EE samples about mothers were borderline, 53.3% of speech samples about fathers were low, 33.3% were borderline, and 13.3% were high. When child EE samples about mothers were high EE, 57.1% were high about fathers, 28.6% were borderline, and 14.3% were low.

Hypothesis 3 High maternal CRIT (but not EOI) will be associated with worse pre-treatment OCD-related functioning and severity.

There were less than 20% missing data in outcome measures. Missing data were imputed using last observation carried forward. Pre- and post-treatment means and standard deviations for measures are presented in Table 3. Those with high maternal CRIT had more severe OCD ($M = 28.43, SD = 5.41$) than those without ($M = 24.44, SD = 4.19, t(59) = -2.29, p < .05$, Hedges' unbiased $g = .92$). Similarly, children with high CRIT toward fathers had more severe OCD ($M = 29.67, SD = 4.63$) than those who did not ($M = 24.15, SD = 4.17, t(56) = -3.04, p < .01$, Hedges's unbiased $g = 1.31$). There was no difference in OCD severity for children with high CRIT about mothers than those

Table 3 Psychopathology and functioning pre- and post-treatment

Variable	Pre-Tx ($n = 62$) M (SD)	Post-Tx ($n = 62$) M (SD)
CY-BOCs total	24.98 (4.49)	15.77 (9.62)
Obsessions	11.92 (2.49)	7.55 (4.79)
Compulsions	13.06 (2.30)	8.23 (5.08)
COIS-parent total	17.65 (9.54)	11.87 (10.67)
School	5.71 (4.29)	3.84 (4.03)
Social	4.16 (3.89)	2.94 (3.78)
Family	7.79 (4.50)	5.08 (4.86)
COIS-child total	12.71 (9.02)	8.54 (7.70)
School	4.45 (3.87)	3.04 (3.79)
Social	3.37 (3.88)	2.28 (2.78)
Family	4.89 (3.68)	3.12 (3.50)

without. Thus, high CRIT (maternal and child about fathers), was associated with more severe pre-treatment child OCD. No differences emerged for functional impairment variables.

Hypothesis 4 High maternal CRIT (but not EOI) will be associated with worse post–treatment OCD-related functioning and severity.

Table 4 presents correlations for pre- and post-treatment measures. Neither parent nor child high CRIT, nor parent high EOI improved prediction of post-treatment OCD severity beyond pre-treatment severity or treatment modality ($ps > .81$). Although the final equation at Step 3 was significant in predicting post-treatment OCD severity, $R = .52$, $F(7, 56) = 2.63$, $p = .02$, $R^2 = .27$ for Step 3, $\Delta R^2 = .00$, only lower pre-treatment OCD

Table 4 Association between pre-treatment EE and pre- and post-treatment OCD severity and functioning

Variable	1	2	3	4	5	6	7	8	9	10
1. Maternal CRIT	–									
2. Maternal EOI	−.08	–								
3. Child CRIT re:mother	.45***	.15	–							
4. Child CRIT re:father	.30*	−.08	.57***	–						
5. CY-BOCs total pre-therapy	.29*	.05	.18	.38**	–					
6. COIS-P total pre-therapy	.23	−.13	.13	.20	.45***	–				
7. COIS-C total pre-therapy	.28*	.04	−.08	−.21	.33*	.46**	–			
8. CY-BOCs total post	.19	.07	.12	.17	.39**	.24	.09	–		
9. COIS-P total post	.37**	.01	.14	.24	.47***	.74***	.31*	.62***	–	
10. COIS-C total post	.07	.18	.35**	.44*	.52***	.41**	.25	.46***	.52***	–

* $p < .05$, ** $p < .01$, *** $p < .001$. COIS-P, COIS-C: parent and child report of COIS respectively

severity ($B = .86$, $SE\ B = .30$, $\beta = .40$) and participation in CBT ($B = -6.45$, SE $B = 2.47$, $\beta = -.34$) were associated with lower post-treatment OCD severity. Thus, high CRIT was not predictive of post-treatment OCD severity beyond pre-treatment OCD severity or treatment modality.

Tables 5 and 6 present significant regression equations showing the additive significant prediction effects of high CRIT (maternal and child) and EOI (maternal only) at Step 3. High pre-treatment maternal CRIT and child CRIT about mothers predicted poorer post-treatment OCD-related functioning across a variety of domains beyond pre-treatment functioning and treatment modality. High maternal CRIT and low child CRIT about mothers predicted worse parent rated post-treatment impact of OCD, $R = .79$, $F(7, 52) = 10.87$, $p = .001$ beyond pre-treatment functioning and treatment modality. For parent-rated school OCD impact, higher maternal CRIT, higher child CRIT about fathers, and lower child CRIT about mothers predicted worse impact of OCD, $R = .74$, $F(7, 52) = 7.73$, $p = .001$ beyond pre-treatment functioning and treatment modality. Also, for parent-rated social impact, higher maternal CRIT and EOI and lower child CRIT about

Table 5 Prediction of maternal-rated post-treatment OCD-related functioning

Variable	B	$SE\ B$	β	Tolerance
COIS-P total[a]				
Pre-treatment COIS-P total	.77	.10	.71***	.94
Medication	−.14	2.00	−.01	.89
CBT	−1.54	1.98	−.07	.91
Maternal CRIT	10.37	3.91	.29*	.68
Maternal EOI	10.47	5.86	.19	.71
Child CRIT re:mothers	−9.75	4.70	−.30*	.40
Child CRIT re:fathers	6.70	4.15	.21	.51
COIS-P-school[b]				
Pre-treatment COIS-P school	.63	.10	.67***	.93
Medication	−.59	.87	−.07	.88
CBT	−.02	.86	.00	.90
Maternal CRIT	5.04	1.70	.36**	.68
Maternal EOI	4.12	2.55	.19	.71
Child CRIT re:mothers	−5.05	2.05	−.39*	.40
Child CRIT re:fathers	3.93	1.79	.31*	.52
COIS-P-social[c]				
Pre-treatment COIS-P social	.61	.09	.72***	.95
Medication	.37	.68	.06	.89
CBT	−.03	.67	−.00	.90
Maternal CRIT	4.25	1.32	.38**	.68
Maternal EOI	5.00	1.98	.29*	.72
Child CRIT re:mothers	−3.51	1.60	−.34*	.40
Child CRIT re:fathers	1.51	1.40	.15	.52

* $p < .05$, ** $p < .01$, *** $p < .001$. Tolerance values below 0.1 are indicative of collinearity

[a] Step 1 $R^2 = .53$, Step 2 $\Delta R^2 = .02$, Step 3 $\Delta R^2 = .08$

[b] Step 1 $R^2 = .40$, Step 2 $\Delta R^2 = .02$, Step 3 $\Delta R^2 = .13$

[c] Step 1 $R^2 = .44$, Step 2 $\Delta R^2 = .01$, Step 3 $\Delta R^2 = .13$

Table 6 Prediction of child-rated post-treatment OCD-related functioning

Variable	B	SE B	β	Tolerance
COIS-C total[a]				
Pre-treatment COIS-total	.44	.14	.39**	.93
Medication	−1.13	2.02	−.07	.86
CBT	−.16	1.96	−.01	.92
Maternal CRIT	−.52	3.94	−.02	.77
Maternal EOI	6.13	5.63	.15	.72
Child EE re:mothers	1.30	4.55	.05	.47
Child EE re:fathers	12.91	4.21	.50**	.55
COIS-C family[b]				
Pre-treatment COIS-C family	.47	.14	.43**	.93
Medication	.58	.96	.08	.86
CBT	.11	.94	.02	.88
Maternal CRIT	1.38	1.86	.11	.77
Maternal EOI	2.52	2.66	.14	.72
Child EE re:mothers	.52	2.14	.04	.47
Child EE re:fathers	4.68	1.96	.40*	.57
COIS-C social[c]				
Pre-treatment COIS-C social	.23	.12	.27	.90
Medication	.36	.78	.06	.86
CBT	.54	.75	.01	.92
Maternal CRIT	−1.50	1.56	−.15	.73
Maternal EOI	1.48	2.18	.11	.72
Child EE re:mothers	1.01	1.76	.11	.47
Child EE re:fathers	3.61	1.63	.39*	.55

* $p < .05$, ** $p < .01$, *** $p < .001$. Tolerance values below 0.1 are indicative of collinearity

[a] Step 1 $R^2 = .09$, Step 2 $\Delta R^2 = .05$, Step 3 $\Delta R^2 = .26$

[b] Step 1 $R^2 = .14$, Step 2 $\Delta R^2 = .00$, Step 3 $\Delta R^2 = .20$

[c] Step 1 $R^2 = .06$, Step 2 $\Delta R^2 = .02$, Step 3 $\Delta R^2 = .20$

mothers predicted poorer functioning, $R = .76$, $F(7, 52) = 8.78$, $p < .001$. Finally, for parent-rated family impact, although the addition of EE variables slightly improved overall prediction, no EE variables predicted post-treatment family OCD impact ($B = .68$, SE $B = .12$, $\beta = .64$), $R = .72$, $F(7, 52) = 6.83$, $p < .001$. Thus, although high pre-treatment child CRIT about mothers was associated with better post-treatment OCD related functioning, high maternal CRIT generally predicted worse OCD-related functioning beyond pre-treatment functioning and treatment modality.

For child-rated post-treatment OCD total impact (Table 6) high child CRIT about fathers predicted poorer functioning, $R = .63$, $F(7, 49) = 3.96$, $p < .01$ beyond pre-treatment functioning and treatment modality. A similar pattern emerged for social and family OCD impact. High child CRIT about fathers was associated with poorer child-rated OCD related social functioning, $R = .53$, $F(7, 49) = 2.32$, $p < .05$. High child CRIT about fathers also predicted poorer child-rated post-treatment OCD family functioning beyond pre-treatment family functioning and treatment modality $R = .59$, $F(7, 49) = 3.16$, $p < .01$. Thus, high child CRIT about fathers was a predictor of poorer child-rated

OCD-related functioning at post-treatment beyond pre-treatment severity or treatment condition. For child-rated OCD impact on school functioning at post-treatment, although the addition of EE variables slightly improved overall prediction, EE did not add to the prediction of post-treatment school functioning above and beyond pre-treatment school functioning ($B = .60$, $SE\ B = .12$, $\beta = .58$) and medication treatment ($B = -1.85$, $SE\ B = .90$, $\beta = -.25$), $R = .68$, $F(7, 49) = 5.01$, $p < .001$.

Discussion

This study is the first to examine whether the components of EE predict treatment outcome in child OCD. Further the current study is the first to use child EE speech samples in children with OCD and to examine whether child EE predicts treatment outcome.

Rates of EE in Maternal and Child Speech Samples

Results indicated that few speech samples (maternal or child) were characterized by high EOI. High EE (child and maternal) was largely driven by high CRIT. This finding may be somewhat surprising for maternal EE given the degree to which parents participate in child OCD rituals [10], and the association between a related construct, overprotection, and child anxiety [12]. However, this result likely reflects the limitations of the downward extension of EOI from adult to pediatric samples. Low rates of high EOI (0–29%) have been found in child samples in other studies [50, 51]. Further, EOI, as measured in parent EE samples, is not associated with behavioral indicators of overinvolvement, does not predict child psychopathology consistently, and is not internally consistent [20, 52].

Results in child EE speech samples indicated a pattern similar to that of maternal speech samples regarding the child with OCD. Rates of high EE were relatively low in child speech samples and were entirely driven by high CRIT. Child EE about mothers and maternal EE about children with OCD were concordant, suggesting that child and maternal perspectives on their relationship are relatively similar. This finding is consistent with the only other study that examined child EE speech samples [34]. Child EE about mothers and fathers were also largely concordant, suggesting that the relationship between children and each of their parents was characterized by similar levels of CRIT and EOI. Marshall and colleagues did not examine the concordance among child speech samples about each parent, therefore, the current study is the first study to do so.

Results of the current study provide support for the state model of EE in maternal speech samples in that there were different rates of EE in maternal speech samples about children with OCD versus about an unaffected sibling. Higher rates of EE were present in maternal speech samples about the child with OCD relative to speech samples about an unaffected sibling. This suggests that EE reflects characteristics of a specific relationship between two people, rather than being a characteristic of the reporter or of the home environment. The concordance between child and maternal speech samples about their relationship provides additional support for the perspective that EE is characteristic of a relationship, not a characteristic of the reporter.

However, the concordance between child EE speech samples about mothers and fathers provides support for the trait model of EE. Child perspectives on the relationship that they have with fathers and mothers were similar, suggesting that either EE is a home environment trait or a trait of the child. It is possible that parents are better able to discriminate subtle differences in their relationship with different children than children are able to

discriminate these differences in their relationships with each parent. Thus, EE may be a state in parent speech samples and more of a trait in child speech samples.

EE, Pre-Treatment Symptom Severity and OCD-Related Functioning

Consistent with previous literature in disorders other than OCD [4–6] EE in the current study was associated with pre-treatment severity. Maternal high CRIT and child high CRIT towards fathers were associated with pre-treatment OCD symptom severity, but not worse pre-treatment OCD-related functioning. Parents of children with OCD experience distress when faced with their child's OCD; therefore, parents may be more critical of children with more severe OCD symptoms. However, it is also possible that maternal criticism contributes to child OCD severity. In contrast, OCD-related functioning prior to treatment may be more of a function of the child's OCD symptoms than a function of the relationship between the child and parent.

EE, Post-Treatment Symptom Severity and OCD-Related Functioning

Maternal and child high CRIT were not predictive of post-treatment OCD severity above and beyond treatment modality and pre-treatment OCD severity. This indicates that post-treatment OCD symptom reduction following treatment was not associated with pre-treatment high CRIT. This finding is inconsistent with one adult study of behavior therapy, which found that high EE predicted less symptom reduction and higher drop-outs [14]. However, the current study included treatment conditions other than behavior therapy, including a placebo condition. It is possible that EE variables would be especially predictive of symptom change in response to therapeutic techniques because high EE may interfere in patient's ability to implement therapy techniques. It is also possible that the presence of the placebo condition decreased the degree of change in the current study. To date, no other studies have examined EE as a predictor of symptom severity. The one study that examined EE as a predictor of child treatment outcome assessed the prediction of global functioning, not symptom reduction, and found that high pre-treatment EE predicted worse global functioning years after the completion of a medication trial [19].

The current study results are consistent with these findings. High maternal CRIT predicted poorer post-treatment parent-rated functioning in school and social domains beyond the effects of pre-treatment functioning and treatment modality. Consequently, maternal CRIT of the child, though not associated with more severe post-treatment OCD, may be associated with poorer functioning in school and social relationships. Parental criticism and overprotective parenting have been theorized to contribute to the development and maintenance of OCD [7, 8] and associations have been found between parental criticism and child anxiety [12]. High maternal CRIT was not predictive of post-treatment OCD-related family functioning.

It may seem counterintuitive that high maternal CRIT was associated with post-treatment parent-reported school and social functioning but not family functioning. It may be that highly critical mothers are especially cognizant of the impact of OCD in environments they view as being under child control, such as school and social interactions. This is the first study to examine EE as a predictor of various aspects of post-treatment child-functioning.

High child CRIT about fathers predicted worse maternal-rated post-treatment OCD-related school functioning and child-rated OCD-related functioning in family and social domains. In contrast, lower child CRIT about mothers predicted maternal report of worse

OCD-related school and social functioning. Thus, when children were *less* critical of their mothers, mothers reported *worse* post-treatment child functioning in school and social domains. These findings emerged after controlling for initial functioning and treatment condition.

It is possible that children were less critical of mothers who accommodate OCD and more critical of mothers who are hostile toward the child for OCD symptoms. Parents often accommodate or criticize the child's OCD symptoms [53], both of which may maintain or increase OCD symptoms [10]. The concordance between child and maternal EE indicates mutual criticism, but the role of accommodation has not been examined.

Studies have shown that different paternal and maternal behaviors are associated with child internalizing symptoms and treatment outcomes. Maternal warmth and psychological control, but no paternal parenting styles, were associated with child internalizing symptoms in one study [54]. In another study, paternal overprotection, but no maternal factors, was related to child anxiety [55]. Further study and replication are necessary to fully understand the complexity of these relationships.

In contrast to high CRIT, high maternal EOI was a predictor of only maternal-rated child OCD-related social functioning. EOI is indicative of parent overprotection, extreme self-sacrifice, and lack of objectivity regarding the patient [2, 3]. It may be that parents who engage in overprotective behaviors also perceive their children to be functioning more poorly in social domains and thus requiring the additional parental protection. It is also possible that parent overinvolvement may contribute to poorer child functioning. Parental overinvolvement and overprotection are associated with child anxiety symptoms [56] and may be a reaction to the child's arousal and emotionality [57]; however, these parental behaviors have been theorized to maintain the child's anxiety. Finally, it is highly possible that EOI is not a construct that is developmentally appropriate for application to EE regarding children, as discussed above.

Rates of high maternal EE in this sample were low relative to that of earlier studies of child OCD in which 46–47% of fathers' and 71–74% of mothers' speech samples were categorized as high EE [15–17]. It is unclear what accounts for these differences. Previous studies were conducted by the one research team (Hibbs and colleagues) and used similar methodology to the current study in children with a similar mean age as the current sample. Previous studies did not provide mean child OCD severity scores; therefore, it is possible that differences in severity may have contributed to the differences in rates of high EE.

The current study was limited by the lack of an anxious or non-clinical control. Maternal EE speech samples about an unaffected sibling allow for differential examination within the family, but sibling psychiatric status was not systematically assessed. Future studies should include a control group with no psychiatric disorders or with disorders other than OCD. In addition, only maternal EE was examined due to the preponderance of mothers participating in pre-treatment assessments. Future studies should examine paternal EE. Further, this sample was primarily Caucasian, limiting the generalizability of findings to other ethnicities.

As in most psychopathology research, there is shared variance in the current study, with the respondent providing EE speech samples and reports for outcome measures. It is possible that associations between child EE speech sample characteristics and child reported OCD-related functioning are partially a result of these both reflecting the child's perspective. Similarly, the association between maternal EE speech sample characteristics and the mother's report of the child's OCD-related functioning may be a result of the shared variance. However, high CRIT in child EE speech samples was predictive of

maternal report of various child OCD-related functioning variables (general, school, and social functioning), therefore, these results are not subject to this limitation.

An additional limitation is the lack of studies examining validity of child EE samples. Concordance between child and maternal EE provides some limited support for validity, but child EE should be compared to observations and EE interviews. The results of the current study may have been limited by small sample size, and therefore limited power.

Summary

This study is an initial step towards understanding the role that family processes play in OCD and the first EE study in child OCD to examine the child's perspective. There were relatively low rates of high maternal EE and child EE about parents. High EE was driven primarily by CRIT. High CRIT was more frequent in maternal EE samples about children with OCD than in samples about an unaffected sibling. This indicates that EE is specific to the relationship between two people, not a trait of the individual providing the speech sample or a characteristic of the family environment. In contrast, child EE regarding mothers and fathers were concordant, providing support for the trait view of child EE. Child and maternal EE were also concordant, indicating similarity in child and maternal perspectives on their relationship. High maternal CRIT and child CRIT regarding fathers were associated with pre-treatment child OCD severity but not post-treatment severity. However, they were associated with generalization of treatment gains. EE may be an important variable associated with pre-treatment OCD severity and generalization of treatment gains. A family-based treatment that addresses criticism within the family environment may be beneficial.

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