Child Abuse & Neglect 50 (2015) 182–192

Contents lists available at ScienceDirect

Child Abuse & Neglect

Research article

Relationships among emotion regulation and symptoms during trauma-focused CBT for school-aged children☆

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ARTICLE INFO

Article history:
Received 25 April 2015
Received in revised form
10 September 2015
Accepted 14 September 2015
Available online 21 October 2015

Keywords:
Emotion regulation
Trauma
Maltreatment
Therapy outcome
Trauma treatment

ABSTRACT

This study examined improvement in emotion regulation throughout Trauma-Focused Cognitive-Behavioral Therapy (TF-CBT) and the degree to which improvement in emotion regulation predicted improvement in symptoms. Traumatized children, 7–12 years (69.9% female), received TF-CBT. Data from 4 time periods were used: pre-assessment ($n = 107$), pre-treatment ($n = 78$), post-treatment ($n = 58$), and 6-month follow-up ($n = 44$). Questionnaires measured emotion regulation in the form of inhibition and dysregulation (Children's Emotion Management Scales) and lability/negativity and emotion regulation skill (Emotion Regulation Checklist), as well as child-reported (Trauma Symptom Checklist for Children) and parent-reported (Trauma Symptom Checklist for Young Children) posttraumatic stress, and internalizing and externalizing problems (Child Behaviuor Checklist). To the extent that children's dysregulation and lability/negativity improved, their parents reported fewer symptoms following therapy. Improvements in inhibition best predicted improvements in child-reported posttraumatic stress (PTS) during clinical services, but change in dysregulation and lability/negativity best predicted improvement in child-reported PTS symptoms at 6-month follow-up. Moreover, statistically significant improvements of small effect size were found following therapy, for inhibition, dysregulation, and lability/negativity, but not emotion regulation skill. These findings suggest that emotion regulation is a worthy target of intervention and that improvements in emotion regulation can be made. Suggestions for future research are discussed.

Introduction

Emotion regulation (ER) refers to a set of processes that monitor, evaluate, and modify emotional reactions (Gross & Thompson, 2007). Difficulty with ER is both an outcome of trauma, and a predictor of psychopathology. Many children who have experienced maltreatment in the form of physical abuse, sexual abuse, and neglect (Kim & Cicchetti, 2010), as well as exposure to domestic violence (Maughan & Cicchetti, 2002) demonstrate difficulty with ER. Furthermore, maltreating families often demonstrate more difficulty regulating emotions than non-maltreating families (Howes, Cicchetti, Toth, & Rogosch, 2000). Maltreated children often become hypersensitive to expressions of anger, such that they become aware of early signs of impending abuse and adjust their behavior in ways that may be protective. Although this vigilance is adaptive

☆ This research was funded by grants to the second author from the Provincial Centre of Excellence for Child and Youth Mental Health at the Children's Hospital of Eastern Ontario, and the Hedge Funds Care Canada Foundation.

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http://dx.doi.org/10.1016/j.chiabu.2015.09.011
0145-2134/

in the abusive situation, it is maladaptive outside of the home. As such, when children are no longer in danger of being maltreated, previously adaptive hypervigilance impedes the normative developmental process of ER.

There is an association between difficulty with ER and childhood symptomatology. Internalizing problems have been found to be correlates of maladaptive forms of ER such as inhibition of anger and dysregulation of both anger and sadness, as well as adaptive forms of ER such as constructive coping with anger (Zeman, Shipman, & Suveg, 2002). Similarly, externalizing problems are related to both maladaptive and adaptive forms of ER, for example emotion dysregulation and constructive coping (Zeman et al., 2002). Because of the link between ER and childhood symptoms, many interventions have been designed to improve ER strategies (Ford, Steinberg, Hawke, Levine, & Zhang, 2012). These interventions operate under two assumptions: first, that ER can indeed be improved through therapy, and second, that improvements will lead to a reduction in symptoms. Research in the first area has produced somewhat mixed results. In a review of the literature, Hannesdottir and Ollendick (2007) found that Cognitive Behavior Therapy (CBT) for anxiety has had limited success in improving ER among children. These authors suggested that the education on affect regulation provided by this type of therapy has traditionally been limited in opportunity for practice, by lack of parental involvement, and in breadth of the emotions that are addressed (often only worry is addressed). By contrast, two interventions incorporating elements of CBT and exposure through trauma narratives demonstrated that improvement in ER is possible among traumatized children (Ellis et al., 2012; Ford et al., 2012). The conclusions that can be drawn from the extant literature are limited because many studies do not directly measure ER (e.g., Bilek & Ehrenreich-May, 2012). Overall, among interventions that have reported improvement in ER and effect sizes, the effects have been small (e.g., Ford et al., 2012; Kley, Heinrichs, Bender, & Tuschen-Caffier, 2012).

The assumption that improvements in ER will lead to reduction in symptoms has not been widely addressed in the child literature, however, a few relevant studies were found. Improvements in maladaptive worry regulation (a combination of worry dysregulation and inhibition), but not adaptive worry coping and anxiety self-efficacy, have predicted improvements in anxiety scores among anxious youth in a CBT intervention (Suveg, Sood, Comer, & Kendall, 2009). Similarly, reductions in maladaptive anxiety regulation predicted reduction in social anxiety following a group CBT intervention (Kley et al., 2012). Finally, improvement in impulse control and engaging in goal directed behavior, partially mediated the relationship between type of treatment (treatment as usual (TAU) versus TAU combined with CBT) and improvement in self-harm (Slee, Spinhoven, Garnefski, & Arensman, 2008). Symptom improvement following interventions designed to improve ER provides additional support for the hypothesis that ER is one mechanism by which improvement in psychopathology occurs (e.g., Bilek & Ehrenreich-May, 2012).

Despite the few studies that measured change in ER directly, there are gaps in the literature. Many interventions designed to improve ER have not directly measured this area of functioning (Bilek & Ehrenreich-May, 2012; Semple, Lee, Rosa, & Miller, 2010). In addition, it is unknown whether improvements in ER lead to positive changes in terms of psychopathology, particularly in children who have experienced trauma. The goal of the current study is to address these gaps by exploring improvement in ER and its relationship to improvement in symptoms following Trauma-Focused Cognitive-Behavioral Therapy.

TF-CBT for Childhood Trauma

Trauma-Focused Cognitive-Behavioral Therapy (TF-CBT; Cohen, Mannarino, & Deblinger, 2006) offers children and their non-offending parents brief trauma treatment. TF-CBT is an evidence-based intervention that has achieved the highest rating on multiple reviews (e.g., Chadwick Center, 2004). The developers have reported the effectiveness of TF-CBT at treating different types of trauma such as sexual abuse (Cohen, Mannarino, & Knudsen, 2005) and traumatic grief (Cohen & Mannarino, 2008; Cohen, Mannarino, & Knudsen, 2004), as well as a variety of symptoms such as posttraumatic stress, depressive, and hyperactive symptoms (Diehle, Opmeer, Boer, Mannarino, & Lindauer, 2015) and sexually inappropriate behavior (Cohen et al., 2005).

Education on ER is woven throughout the TF-CBT model. The first phase of therapy is devoted to skill building. Children and their parents are taught a wide range of emotions, arousal reduction strategies (e.g., deep breathing, progressive muscle relaxation), and cognitive strategies for targeting unhelpful thoughts (Cohen et al., 2006). Parents are taught to use praise, selective attention, and contingency reinforcement to help children manage their responses to emotion. Involving parents in treatment maximizes the benefits of the intervention, because they can help their children to apply new strategies to everyday life, both throughout therapy and after termination.

In the second phase of treatment children develop a trauma narrative (Cohen et al., 2006). This serves as a type of gradual exposure for the child, who progressively adds details to the story. The therapist helps the child to use strategies developed in the first part of therapy to regulate difficult emotions. The therapist coaches the parent how to react to the child when he or she shares the narrative. The parent, supported by the therapist, then models appropriate emotions for the child, including sadness following a traumatic event, pride for their child who has worked hard to express him or herself, and hope for the future. Together, the components of TF-CBT include many of the recommendations made by Hannesdottir and Ollendick (2007) for effective affect regulation education. As such, TF-CBT may be a good context within which to examine changes to ER. Whereas, there is an abundance of evidence that TF-CBT reduces symptoms, as yet, there is no evidence that the ER strategies that are taught during TF-CBT are effective at improving ER in the children that are treated. In addition, researchers have not yet looked at whether improvement in ER predicts improvement in symptoms in children treated with TF-CBT.

The Current Study

Previous research demonstrated the effectiveness of TF-CBT on this sample at reducing both child- and parent-reported symptoms of posttraumatic stress, over and above the passage of time alone (Konanur & Muller, 2013; Konanur et al., 2015). The purpose of the current study was to extend these results by exploring the relationships between ER and symptom change. As yet, there is little evidence that interventions aimed at producing change in ER impact child psychopathology, and this relationship has never been explored in TF-CBT. In addition, changes in ER have not been extensively explored among traumatized children in therapy, and no work of this nature has been done with TF-CBT. This study began to address these gaps in the literature by looking at improvement in ER following TF-CBT and examining whether improvements in ER predicted improvements in symptoms. This research is especially pertinent given the strong link between ER and childhood trauma, and the wide use of TF-CBT to treat these children.

Method

Data presented here are from the Healthy Coping Program (HCP; Muller & Di Paolo, 2008), a multisite research project. The purpose of the project was to investigate the effectiveness of TF-CBT treatment delivered by therapists from nine community agencies across a large diverse city in Canada. Ethics approval for this study was obtained from York University and from each of the participating agencies.

Participants

Families of children between 7 and 12 years who had verified trauma experiences self-referred to: (a) BOOST Child Abuse Prevention & Intervention (BOOST) and (b) Peel Children's Centre (PCC), two agencies that provide clinical assessment to this population. Families were invited to participate if a non-offending parent was able to participate in therapy, neither the child nor parent had a substance use or psychotic disorder, the child was not suicidal, the child did not have a developmental disorder that would interfere with therapy, if taking psychotropic medication the regimen was stable, and the child had not received prior treatment directly related to the trauma.

Of the families approached about participation ($n = 158$), 30 declined prior to hearing about the study, and 8 declined after the research was described. Thirteen families were excluded due to study criteria. Fourteen families were excluded following at least one data collection because the therapist no longer deemed TF-CBT to be an appropriate course of treatment or the therapist had strayed from the model. A total of 108 children participated in at least one data collection.

Within the sample, 69.9% of the children were female. Participating parents identified their children as 38.1% European Canadian, 18.1% African Canadian, 10.5% Latin American Canadian, 5.7% South Asian Canadian, 4.8% Asian Canadian, 1.9% Aboriginal, and 21.0% other ethnicities. Seventy-five percent of children had no prior diagnosis upon referral. Attention Deficit Hyperactivity Disorder and Learning Disabilities were most common diagnoses (11.3% each), and 4.0% of children were taking a psychotropic medication at referral. Participating parents were predominantly biological/adoptive mothers (83.3%) and ranging from 25 to 72 years ($M = 37.23$, $SD = 8.13$). Household incomes were reported as less than $20,000 per year (41.0%), $20,000 and $39,999 (16.2%), $40,000 and $59,999 (21.9%), and over $60,000 (21.0%).

Children were referred for treatment due to sexual abuse (75.2%), physical abuse (11.5%), witnessing domestic violence (7.1%), traumatic loss of a caregiver (2.7%), home invasion (2.7%), and bullying (0.9%). Most children had experienced other traumas in addition to the referral trauma (74.3%). In cases in which there were direct perpetrators (as in abuse or witnessing violence), perpetrators were most often known to the child victim (92.0%), male (96.5%), and adults (80.5%).

Procedure

Data Collection Timeline in Relation to Clinical Services. Data were collected from March 2006 through November 2011 at BOOST and from July 2009 through January 2013 at PCC. Families were recruited as they were referred for services, such that data collection was ongoing, occurring when participants naturally reached service milestones. From March 2006 to August 2008, participating families from BOOST were randomly assigned to either a waitlist control or to an immediate services group. Participants in the waitlist control group were required to wait three-months prior to receiving assessment. Families were no longer placed in the waitlist control group following August 2008, due to an agency policy change at BOOST.

All participating families received a clinical assessment at BOOST or PCC. For the families on the waitlist, the assessment occurred after a three-month waiting period. Assessments averaged 3.31 sessions. Following assessment, participating families assessed at BOOST were triaged to 7 community agencies for treatment. Children assessed at PCC remained there for treatment. All families were treated using TF-CBT.

The data were collected at five time points. Participants completed questionnaires with the help of research assistants. Families in the waitlist group completed measures before the waiting period (1 – waitlist). All participants were asked to complete measures prior to the assessment and after the three-month wait for those in the waitlist control group (2 – pre-assessment), following assessment and prior to treatment (3 – pre-treatment), immediately after treatment (4 – post-treatment), and six-months following treatment (5 – follow-up). Data are available for 107 children at pre-assessment (97 with parent-report measures), 78 at pre-treatment (68 with parent-report), 58 at post-treatment (53 with

parent-report), and 44 at follow-up (40 with parent-report). Whereas the attrition rate in this study is relatively high, it is within the range of 50–75% reported by other studies of child and family therapy (Kendall & Sugarman, 1997). There were no baseline differences between study completers and non-completers on any of the variables at any of the time points (i.e., inhibition, dysregulation, lability/negativity, poor ER skill, child-reported PTS, parent-reported PTS, internalizing symptoms, or externalizing symptoms). The latter four time periods were used for this study (pre-assessment through follow-up). Families received a $20 stipend for each of the first four data collections and $30 for the final data collection, and were able to skip the waiting list for treatment. Families received an average of 17.05 sessions of TF-CBT.

Fourteen sets of two siblings, and two sets of three siblings participated in the study. In order to determine whether inclusion of siblings had an influence on the results, analyses were run including siblings, and again with only one sibling from each family. The results did not differ for any of the hypotheses; therefore, all siblings were retained.

Therapists

Thirty-four therapists took part in this study. Participating therapists were predominantly female (33 of 34) with Master's level education (75.8%). Therapists saw an average of 2.2 children for the study. All therapists were required to read the TF-CBT training manual (Cohen et al., 2006), and completed web-based training program. Therapists also attended TF-CBT training workshops given by experts in the field. Small facilitation groups met monthly to review cases and questions regarding TF-CBT, in order to ensure model fidelity. Therapists also attended monthly clinical meetings where they received peer consultation by psychologists with expertise in TF-CBT (i.e., Dr. Amy Hoch and Dr. Melissa Runyon from the CARES Institute in New Jersey). Finally, an adherence checklist revealed that therapists were highly consistent with the model.

Measures

CEMS. The Children's Emotion Management Scales (Suveg & Zeman, 2004; Zeman, Shipman, & Penza-Clyve, 2001; Zeman, Cassano, Suveg, & Shipman, 2010) consist of three 3-point scales evaluating children's self-reported ER for sadness (12 items), anger (11 items), and worry (10 items). Representative items for each of the scales include "I hold my sad feelings in," "I can stop myself from losing my temper," and "I talk to someone until I feel better when I'm worried" respectively. Other authors (e.g. Shipman, Edwards, Brown, Swisher, & Jennings, 2005; Suveg & Zeman, 2004) have combined the emotions into three scales for inhibition, dysregulation, and coping. In the current study the inhibition and dysregulation scales were used. Inhibition measures the child's tendency to keep emotional experiences inside, avoiding outward expression. Dysregulation represents a tendency to act out emotions in socially inappropriate ways. The scale authors report moderate internal consistency (α from .62 to .80) and two-week test-retest reliabilities range from .61 to .80. Convergent validity has been reported (Suveg & Zeman, 2004; Zeman et al., 2001). In the current study the alpha reliabilities for all measures are reported in Table 1.

ERC. The Emotion Regulation Checklist (Shields & Cicchetti, 1997) is a 24-item parent-report measure of children's ability to regulate emotions. Two subscales measure different forms of response modulation on a 4-point scale, ranging from "*Never*" to "*Almost always*." Lability/Negativity refers to a lack of flexibility, mood lability, and dysregulated negative affect (e.g., "Is prone to angry outbursts/tantrums easily"). Emotion Regulation taps into socially appropriate emotional displays, emotional self-awareness, and empathy (e.g., "Responds positively to neutral or friendly overtures by adults"). This scale will be described as *emotion regulation skill* (ER skill) in order to avoid confusion with ER as a broader concept. ER skill was reverse coded so that higher scores reflected poorer ER skill. Convergent validity and internal consistency have been demonstrated (α from .83 to .96; Shields & Cicchetti, 1997).

TSCC. The Trauma Symptom Checklist for Children (Briere, 1996) is a 54-item self-report of posttraumatic stress and related symptoms. Children 8–16 years rate items on a 4-point scale, from 1 "*Never*" to 4 "*Almost all of the time*." Responses produce six clinical scale scores. In the current study only the Posttraumatic Stress (PTS) scale was used (e.g., "Remembering things I don't want to remember"). The author reports strong internal consistency ($\alpha = .87$), convergent and discriminant validity for this scale.

TSCYC. The Trauma Symptom Checklist for Young Children (Briere, 2005) is a 90-item parent-report of trauma symptoms in children 3–12 years. Each symptom is rated on a 4-point scale, from 1 "*Not at all*" to 4 "*Very often*." Responses are combined to form eight scales. In the current study the total Posttraumatic Stress (PTS) scale was used (e.g., "Suddenly seeing, feeling, or hearing something bad that happened in the past"). The author reported strong internal consistency ($\alpha = 92$), two-week test-retest reliability of .87, and concurrent and discriminant validity for this scale (Briere, 2005).

CBCL. The Child Behaviour Checklist (Achenbach & Rescorla, 2001) consists of 118 items measuring symptoms in children 6–18 years. Parents rate items from 1 "*Not true*" to 3 "*Very true or often true*." Scores may be grouped into Internalizing (e.g., "Withdrawn, doesn't get involved with others") and Externalizing (e.g., "Cruelty, bullying, or meanness to others") scales.

Table 1
Descriptive statistics and alpha reliabilities for raw scores.

Measure	*M*	*SD*	*CI* (95%)	*α*
Inhibition				
Pre-assessment	22.72	5.13	21.73–23.71	.82
Pre-treatment	22.22	4.61	21.17–23.28	.79
Post-treatment	21.70	3.57	20.76–22.65	.64
Six-month follow-up	20.72	3.97	19.50–21.94	.74
Dysregulation				
Pre-assessment	16.01	3.93	15.25–16.77	.75
Pre-treatment	15.49	3.84	14.61–16.37	.74
Post-treatment	14.93	3.39	14.03–15.83	.69
Six-month follow-up	14.30	3.64	13.18–15.42	.77
Lability/negativity				
Pre-assessment	30.72	6.19	29.46–31.99	.81
Pre-treatment	30.28	6.92	28.60–31.97	.85
Post-treatment	28.83	6.21	27.10–30.56	.82
Six-month follow-up	28.95	6.78	26.78–31.12	.88
Poor emotion regulation skill				
Pre-assessment	15.00	3.70	14.25–15.75	.73
Pre-treatment	14.46	3.41	13.63–15.29	.69
Post-treatment	14.08	3.73	13.04–15.11	.76
Six-month follow-up	14.15	3.97	12.88–15.42	.79
Child-reported PTS				
Pre-assessment	10.69	6.63	9.41–11.97	.86
Pre-treatment	9.34	6.80	7.79–10.90	.88
Post-treatment	7.71	5.33	6.31–9.12	.82
Six-month follow-up	7.19	6.22	5.27–9.10	.88
Parent-reported PTS				
Pre-assessment	45.31	12.02	42.88–47.75	.90
Pre-treatment	45.00	11.30	42.24–47.76	.90
Post-treatment	40.00	11.54	36.82–43.18	.92
Six-month follow-up	38.88	11.80	35.10–42.65	.93
Internalizing symptoms				
Pre-assessment	14.43	9.07	12.58–16.28	.88
Pre-treatment	12.49	8.74	10.36–14.63	.89
Post-treatment	10.09	9.65	7.44–12.75	.90
Six-month follow-up	9.20	8.40	6.51–11.89	.90
Externalizing symptoms				
Pre-assessment	13.08	8.76	11.30–14.87	.90
Pre-treatment	11.40	9.53	9.08–13.73	.92
Post-treatment	9.13	7.50	7.07–11.20	.89
Six-month follow-up	9.45	8.35	6.78–12.12	.90

The authors report strong internal consistency and test-retest reliability. Strong discriminant (Achenbach & Rescorla, 2001) and convergent (Smith & Reddy, 2002) validity have been demonstrated.

Data Analyses

All statistical analyses were performed using SPSS v.20.0 (IBM Corp, 2011). Previous work using this sample revealed that children's PTS symptoms improved over the course of TF-CBT (Konanur & Muller, 2013; Konanur et al., 2015), and that treatment gains were maintained. Furthermore, statistically significant symptom change occurred from pre-assessment to post-treatment, not only during the treatment period. For this reason all analyses explored both pre-assessment and pre-treatment as baseline data. Cook's *D* was used to examine for influential cases. Individual cases were removed from specific analyses when they meaningfully impacted the results. One-tailed tests of significance were used as hypotheses were directional. Namely, ER would improve throughout therapy and these improvements would predict symptom improvement. Improvement in ER throughout therapy was measured using paired samples *t*-tests.

Linear regression using change scores was used to determine the extent to which improvement in ER predicted improvement in symptoms. Change scores were calculated for all variables by subtracting the score for the later time period from the score for the earlier time period, such that higher scores represent greater improvement in ER or symptoms. Change scores control for baseline differences between individuals, for error variance, and are unaffected by the third variable problem (Cribbie & Jamieson, 2000). Separate models were run for each type of symptom change at each time period (pre-assessment to post-treatment, pre-treatment to post-treatment, pre-assessment to follow-up, pre-treatment to follow-up), resulting in four models at each time period. The four measures of ER were included in each model.

Because this method of analysis has been found to be biased when the data are skewed, or floor (or ceiling) effects are present (Cribbie & Jamieson, 2000), a second set of linear regression models was run to see if post-treatment ER, controlling for pre-assessment ER, predicted post-treatment symptom, controlling for pre-assessment symptom. Again, all four measures

Table 2
Intercorrelations among emotion regulation variables.

Measure	1a	1b	1c	1d	2a	2b	2c	2d	3a	3b	3c	3d	4a	4b	4c
1. Inhibition															
a. Pre-assessment	1														
b. Pre-treatment	.55[c]	1													
c. Post-treatment	.20	.19	1												
d. Follow-up	.10	.56[c]	.31[a]	1											
2. Dysregulation															
a. Pre-assessment	−.18	−.04	.01	.03	1										
b. Pre-treatment	−.13	.02	−.27[a]	.07	.61[c]	1									
c. Post-treatment	−.16	−.15	.06	.19	.27[a]	.42[c]	1								
d. Follow-up	−.05	−.23	−.03	−.09	.39[b]	.52[c]	.51[c]	1							
3. Lability/negativity															
a. Pre-assessment	.14	.17	−.02	.25	.09	.29[b]	.16	.15	1						
b. Pre-treatment	.12	.19	.12	.50[c]	−.01	.18	.08	.03	.67[c]	1					
c. Post-treatment	−.02	.00	.06	.30[a]	.19	.29[a]	.17	.17	.65[c]	.78[c]	1				
d. Follow-up	−.04	.16	.25	.43[b]	.27[a]	.14	.04	.01	.72[c]	.76[c]	.79[c]	1			
4. Poor ER skill															
a. Pre-assessment	.27[b]	−.02	.15	.12	.13	.08	.02	−.02	.45[c]	.32[b]	.36[b]	.31[a]	1		
b. Pre-treatment	.32[b]	.08	.19	.11	−.19	.02	−.12	−.15	.35[b]	.42[c]	.44[c]	.41[b]	.64[c]	1	
c. Post-treatment	.09	.04	.07	.10	−.11	−.01	−.04	−.01	.18	.17	.42[c]	.36[a]	.64[c]	.65[c]	1
d. Follow-up	.36[a]	.16	.42[b]	.18	−.09	−.12	−.09	−.12	.35[a]	.32[a]	.43[b]	.50[c]	.69[c]	.75[c]	.73[c]

Note. Poor ER skill = poor emotion regulation skill.
[a] $p < .05$.
[b] $p < .01$.
[c] $p < .001$.

of ER were included in each model looking at one type of symptom at each time period. The same method was used to look at the time periods between pre-treatment and post-treatment, pre-assessment and follow-up, and pre-treatment and follow-up. This method of analyzing the data was not chosen as a primary method because correlations between pre- and post-test predictors can bias the relationship between the predictors of interest and change (Cribbie & Jamieson, 2000). The results of this second, covariate, method of data analysis are presented when they differ from the change score method.

Results

Preliminary Analyses

Means, standard deviations, and alpha reliabilities for each variable appear in Table 1. Correlations among the measures of ER were examined for multicollinearity (see Table 2). The different measures were often significantly correlated with each other; however, none of the correlations between different measures were suggestive of significant problems with multicollinearity (.80 or higher). Square-root transformations were used to transform all of the variables except parent-reported PTS, which was log transformed. All of the analyses that follow were performed using the transformed variables. The assumptions of linearity, and homoscedasticity were examined using bivariate plots and regression residuals. These assumptions were met.

A one-way between subjects ANOVA was conducted to determine whether there were any unhypothesized relationships between demographic variables and the four symptoms. There were no significant effects of household income, child age, or child ethnicity on any of the variables at any of the time periods. By contrast there was a significant effect of gender on externalizing behavior at pre-assessment [$F(1,88) = 4.31$, $p = .04$], and post-treatment [$F(1,51) = 4.86$, $p = .03$], such that parents of males reported higher levels of externalizing behavior. At pre-assessment the mean score for males was 15.82 ($SD = 10.25$) and that for the females was 11.73 ($SD = 7.74$) and at post-treatment the mean score for the males was 12.79 ($SD = 9.72$) and that for the females was 7.82 ($SD = 6.16$). Gender was not included in later analyses because the effects of gender were not found across all time periods and relatively few males participated.

Improvement in Emotion Regulation Over the Course of TF-CBT

From *pre-assessment to post-treatment*, both inhibition and lability/negativity significantly improved. Although the change in dysregulation was not statistically significant, the *t*-score and effect size were similar to those found for inhibition and lability/negativity. From *pre-assessment to follow-up*, both inhibition and dysregulation improved. From *pre-treatment to post-treatment*, only lability/negativity improved. And finally, from *pre-treatment to follow-up* inhibition, dysregulation, and lability/negativity improved. Overall, results show that inhibition, dysregulation, and lability/negativity improved throughout clinical services for children engaged in TF-CBT treatment. The effect sizes were small. Poor ER skill did not improve. See Table 3.

Table 3
Paired-samples *t*-tests measuring improvement in emotion regulation.

	Mean at 1st time period *M* (*SD*)	Mean at 2nd time period *M* (*SD*)	*CI* (95%) of the difference	*t* (df)	*p*	Cohen's *d*
Pre-assessment to post-treatment						
Inhibition	4.77 (0.52)	4.64 (0.39)	−0.02 to 0.29	1.77 (55)	.04	0.30
Dysregulation	3.95 (0.47)	3.83 (0.45)	−0.03 to 0.26	1.61 (55)	.06	0.26
Lability/negativity	5.47 (0.59)	5.35 (0.57)	−0.02 to 0.25	1.69 (50)	.05	0.20
Poor ER skill	3.81 (0.48)	3.73 (0.50)	−0.03 to 0.20	1.41 (50)	.08	0.17
Pre-assessment to six-month follow-up						
Inhibition	4.71 (0.53)	4.52 (0.44)	−0.01 to 0.39	1.92 (41)	.03	0.39
Dysregulation	3.96 (0.46)	3.75 (0.47)	0.05 to 0.37	2.63 (41)	.01	0.45
Lability/negativity	5.47 (0.59)	5.36 (0.62)	−0.04 to 0.26	1.49 (38)	.07	0.18
Poor ER skill	3.79 (0.45)	3.73 (0.53)	−0.07 to 0.19	0.96 (38)	.17	0.12
Pre-treatment to post-treatment						
Inhibition	4.69 (0.48)	4.65 (0.40)	−0.11 to 0.19	0.58 (54)	.28	0.10
Dysregulation	3.91 (0.48)	3.86 (0.44)	−0.08 to 0.18	2.37 (42)	.22	0.11
Lability/negativity	5.45 (0.60)	5.32 (0.58)	0.01 to 0.24	2.20 (48)	.02	0.21
Poor ER skill	3.73 (0.45)	3.70 (0.51)	−0.09 to 0.14	0.46 (48)	.32	0.05
Pre-treatment to six-month follow-up						
Inhibition	4.65 (0.51)	4.53 (0.44)	−0.01 to 0.26	1.82 (42)	.04	0.26
Dysregulation	3.93 (0.51)	3.75 (0.47)	0.03 to 0.33	2.37 (42)	.01	0.36
Lability/negativity	5.46 (0.57)	5.25 (0.46)	−0.01 to 0.25	1.82 (39)	.04	0.20
Poor ER skill	3.73 (0.47)	3.73 (0.53)	−0.11 to 0.11	0.01 (39)	.50	0.00

Note. Poor ER skill = poor emotion regulation skill.

Improvement in Emotion Regulation as a Predictor of Symptom Improvement

Change Score Method. The four ER change scores shared a significant proportion of the variability in improvement of many of the symptoms across different time periods. Results are presented in Tables 4 and 5. Overall, improvement in inhibition was the best predictor of improvement in child-reported PTS symptoms over the treatment period. However, when the follow-up period was included in the analyses, improvement in dysregulation and lability/negativity were the best predictors of improvement in child-reported PTS symptoms. For the parent-reported symptoms, improvement in lability/negativity was the most consistent predictor of symptom improvement. Improvement in lability/negativity significantly predicted improvement in parent-reported PTS, internalizing, and externalizing symptoms over the treatment period, regardless of whether the treatment period included assessment or not. At follow-up, improvement in lability/negativity continued to be the best predictor of parent-reported symptom improvement, however, the effect was less consistent. Finally, when looked

Table 4
Predicting improvement in symptoms from improvement in emotion regulation, beginning at pre-assessment.

	From pre-assessment to post-treatment					From pre-assessment to six-month follow-up				
	B	SE *B*	*β*	*t*	*CI* (95%)	*B*	SE *B*	*β*	*t*	*CI* (95%)
Child-reported PTS	R^2 = .21, $F(4,41)$ = 2.68, p = .05					R^2 = .39, $F(4,24)$ = 3.77, p = .02				
Inhibition	0.75	0.26	.42	2.93[b]	0.23 to 1.26	0.32	0.23	.24	1.37	−0.16 to 0.80
Dysregulation	−0.07	0.28	−.04	−0.26	−0.64 to 0.50	0.69	0.29	.41	2.37[a]	0.09 to 1.29
Lability/negativity	0.38	0.40	.15	0.94	−0.44 to 1.20	0.66	0.31	.37	2.11[a]	0.01 to 1.31
Poor ER skill	−0.24	0.38	−.01	−0.62	−1.00 to 0.53	0.29	0.35	.13	0.74	−0.46 to 0.98
Parent-reported PTS	R^2 = .22, $F(4,43)$ = 3.09, p = .03					R^2 = .13, $F(4,30)$ = 1.17, p = *ns*				
Inhibition	0.04	0.03	.19	1.35	−0.02 to 0.10	0.02	0.03	.16	0.89	−0.03 to 0.08
Dysregulation	0.02	0.03	.08	0.57	−0.05 to 0.08	0.02	0.03	.13	0.72	−0.04 to 0.09
Lability/negativity	0.10	0.04	.37	2.55[b]	0.20 to 0.17	0.06	0.04	.27	1.45	−0.02 to 0.14
Poor ER skill	0.01	0.04	.02	0.16	−0.08 to 0.09	0.00	0.05	−.01	−0.05	−0.09 to 0.09
Internalizing	R^2 = .45, $F(4,37)$ = 7.41, p < .001					R^2 = .21, $F(4,30)$ = 1.97, p = *ns*				
Inhibition	0.58	0.20	.38	2.95[b]	0.18 to 0.97	0.29	0.29	.18	1.01	−0.29 to 0.87
Dysregulation	−0.13	0.21	−.08	−0.62	−0.56 to 0.30	0.07	0.34	.03	0.19	−0.62 to 0.75
Lability/negativity	1.10	0.31	.54	3.54[c]	0.47 to 1.74	0.63	0.42	.27	1.48	−0.24 to 1.49
Poor ER skill	−0.47	0.35	−.20	−1.36	−1.18 to 0.23	0.54	0.47	.20	1.16	−0.41 to 1.49
Externalizing	R^2 = .56, $F(4,39)$ = 12.48, p < .001					R^2 = .34, $F(4,30)$ = 3.78, p = .01				
Inhibition	0.52	0.20	.29	2.59[b]	0.11 to 0.92	0.38	0.27	.23	1.42	−0.17 to 0.92
Dysregulation	0.18	0.23	.08	0.78	−0.28 to 0.63	0.63	0.31	.31	2.02[a]	−0.01 to 1.27
Lability/negativity	1.46	0.34	.53	4.34[c]	0.78 to 2.14	0.85	0.39	.36	2.15[a]	0.04 to 1.65
Poor ER skill	0.42	0.31	.16	1.36	−0.21 to 1.05	0.38	0.43	.14	0.88	−0.51 to 1.27

Note. Poor ER skill = poor emotion regulation skill; internalizing = internalizing symptoms; externalizing = externalizing symptoms.
[a] p < .05.
[b] p < .01.
[c] p < .001.

Table 5
Predicting improvement in symptoms from improvement in emotion regulation, beginning at pre-treatment.

	From pre-treatment to post-treatment					From pre-treatment to six-month follow-up				
	B	SE *B*	*β*	*t*	*CI* (95%)	*B*	SE *B*	*β*	*t*	*CI* (95%)
Child-reported PTS	R^2 = .40, $F(4,37)$ = 6.08, p < .001					R^2 = .53, $F(4,26)$ = 7.30, p < .001				
Inhibition	0.88	0.29	.42	3.03[b]	0.29 to 1.47	−0.27	0.30	−.13	−0.92	−0.88 to 0.34
Dysregulation	0.84	0.33	.35	2.53[b]	0.17 to 1.51	0.82	0.27	.43	3.02 [b]	0.26 to 1.37
Lability/negativity	0.23	0.42	.08	0.54	−0.62 to 1.08	1.79	0.44	.63	4.04[c]	0.88 to 2.70
Poor ER skill	−0.43	0.43	−.16	−1.00	−1.29 to 0.44	−0.47	0.45	−.17	−1.03	−1.40 to 0.46
Parent-reported PTS	R^2 = .10, $F(4,42)$ = 1.22, p = *ns*					R^2 = .06, $F(4,30)$ = 0.50, p = *ns*				
Inhibition	0.01	0.02	.05	0.29	−0.04 to 0.06	0.02	0.04	.08	0.46	−0.06 to 0.09
Dysregulation	0.00	0.03	.00	0.01	−0.06 to 0.06	0.01	0.03	.06	0.32	−0.06 to 0.08
Lability/negativity	0.08	0.04	.32	1.95[a]	0.00 to 0.15	0.05	0.04	.23	1.22	−0.03 to 0.14
Poor ER skill	0.00	0.04	−.02	−0.10	−0.08 to 0.07	−0.02	0.05	−.06	−0.31	−0.12 to 0.09
Internalizing	R^2 = .28, $F(4,36)$ = 3.42, p = .02					R^2 = .18, $F(4,31)$ = 1.68, p = *ns*				
Inhibition	0.37	0.26	.21	1.40	−0.16 to 0.89	−0.23	0.37	−.10	−0.61	−0.98 to 0.53
Dysregulation	0.76	0.35	.33	2.16[a]	0.05 to 1.46	0.27	0.33	.14	0.83	−0.40 to 0.94
Lability/negativity	0.75	0.44	.32	1.70[a]	−0.14 to 1.63	0.87	0.39	.38	2.23[a]	0.08 to 1.67
Poor ER skill	−0.44	0.50	−.16	−0.88	−1.46 to 0.58	−0.06	0.52	−.02	−0.11	−1.13 to 1.01
Externalizing	R^2 = .32, $F(4,39)$ = 4.51, p = .01					R^2 = .35, $F(4,28)$ = 3.80, p = .01				
Inhibition	0.27	0.16	.23	1.64	−0.06 to 0.60	−0.09	0.34	−.04	−0.27	−0.78 to 0.60
Dysregulation	−0.13	0.20	−.10	−0.67	−0.53 to 0.27	−0.46	0.28	−.26	−1.62	−1.03 to 0.12
Lability/negativity	0.83	0.27	.50	3.04[b]	0.28 to 1.38	1.20	0.42	.51	2.83[b]	0.33 to 2.07
Poor ER skill	0.04	0.32	.02	0.12	−0.60 to 0.68	0.34	0.50	.12	0.68	−0.69 to 1.37

Note. Poor ER skill = poor emotion regulation skill; internalizing = internalizing symptoms; externalizing = externalizing symptoms.
[a] p < .05.
[b] p < .01.
[c] p < .001.

at concurrently with the other types of ER, improvement in poor ER skill did not predict improvement in any of the symptoms measured.

Covariate Method. The results of this method of data analysis are presented only when the standardized beta weights differ in magnitude of .20 or more from the change score method above. One problem with this covariate method of analysis was that the variance inflation factor (VIF) often surpassed the identified cut-off of three. This was likely due to the strong correlations between each type of ER across time points. In the analyses below, the VIF was below three unless otherwise noted.

At post-treatment, dysregulation predicted child-reported PTS, controlling for these variables at pre-assessment [β = .23, $t(45)$ = 1.99, p = .03.], in contrast to the change score method. Also at post-treatment, inhibition did not predict internalizing problems when controlling for these variables at pre-assessment [β = .11, $t(41)$ = 1.24, p = *ns*]. This was in contrast with the change score method. Finally, the standardized regression weight when externalizing symptoms were regressed on lability/negativity at post-treatment, controlling for these variables at pre-assessment, was .22 units higher using the covariate method than when using the change score method [β = .75, $t(43)$ = 4.54, p < .001], although both methods led to the same conclusion. The VIF for lability/negativity at post-treatment was 3.90.

At post-treatment, the standardized regression weight when externalizing symptoms were regressed on inhibition, controlling for these variables at pre-treatment, was .25 units lower using the covariate method [β = −.02, $t(43)$ = −.26, p = *ns*]. Both methods led to the same conclusion. At follow-up, the standardized regression weight when child-reported PTS symptoms were regressed on lability/negativity, controlling for these variables at pre-treatment, was .24 units higher using the covariate method [β = .87, $t(30)$ = 4.26, p < .001], although both methods led to the same conclusion. The VIF for lability/negativity at follow-up was 5.00. Lastly at follow-up, the standardized regression weight when internalizing symptoms were regressed on ER skill was .27 units higher than the change score method [β = .25, $t(35)$ = 1.06, p = *ns*]. The conclusions drawn from both methods were the same. The VIF for poor ER skill at follow-up was 4.01.

These secondary covariate analyses led to different conclusions only twice, both in the time period from pre-assessment to post-treatment. First, only the covariate method found that improvement in dysregulation predicted improvement in child-reported PTS. Second, only the change score method found that improvement in inhibition predicted improvement in internalizing problems. Overall, both methods of analysis found that that change in inhibition was the most robust predictor of improvement in child-reported PTS during clinical services, but change in dysregulation and lability/negativity best predicted improvement in child-reported PTS symptoms at six-month follow-up. In terms of parent-reported symptoms, improvement in lability/negativity was the most consistent predictor of symptom improvement.

Discussion

Given the well-established relationships between ER and childhood symptomatology, a variety of different therapeutic approaches have been designed to address maladaptive ER. These therapy protocols assume that ER can be improved through

therapeutic intervention and that improvements in ER will lead to reductions in symptoms. As yet, neither of these assumptions has been widely studied. The results of the current investigation suggest that TF-CBT can result in improvements in ER. Furthermore, to the extent that children do improve in terms of maladaptive ER strategies, their symptoms are improved.

Improvement in Emotion Regulation as a Predictor of Improvement in Symptoms

Improvement in lability/negativity and dysregulation were the most robust predictors of symptom change. Lability/negativity and dysregulation are similar constructs in that both measure outward expressions of difficult emotions. These emotional displays are typically considered socially inappropriate ways of dealing with emotions. Children who have experienced trauma have higher levels of lability/negativity than their non-traumatized peers (e.g., Shields & Cicchetti, 1998; Shipman et al., 2007). Moreover, lability/negativity and dysregulation have been linked to a variety of psychological symptoms (e.g., Kim-Spoon, Cicchetti, & Rogosch, 2013; Muller, Vascotto, Konanur, & Rosenkranz, 2013; Zeman et al., 2002). Thus, it is pertinent that improvement in lability/negativity and dysregulation play an important role in symptom improvement.

Maltreating families evince more difficulty regulating emotions than non-maltreating families (Howes et al., 2000). Thus, traumatized children have less opportunity than their non-traumatized peers to learn effective ER strategies because these skills are often not modeled at home. It has been demonstrated that mothers' emotional coaching among children high in lability/negativity is associated with lower levels of externalizing behavior, supporting the notion that involving parents in ER education may be an import aspect of symptom change (Dunsmore, Booker, & Ollendick, 2013).

Throughout clinical services, but not at follow-up, improvement in inhibition was the best predictor of improvement in child-reported PTS symptoms. Children inhibit emotional expression in an attempt to avoid difficult emotional experiences. By holding emotions inside, the child fails to fully experience the emotion. The result that improvement in inhibition predicts improvement in child-reported PTS symptoms suggests that to the extent that children experience and express negative emotions they also perceive reductions in their own PTS symptoms. It is interesting that this relationship was only seen during the clinical services period and was not maintained at six-month follow-up. It may be that improvement in PTS symptoms occurred in the context of a supportive relationship between children and their therapists. Although small improvements in inhibition were maintained at six-month follow-up, it may be that the magnitude of these improvements in expressed emotions was not enough to maintain gains in PTS symptoms when the child was no longer in contact with the therapist.

When four types of ER were looked at concurrently, improvement in none of the different symptoms was predicted by improvement in poor ER skill. It may be that that improvement in ER skill has little or no impact on improvement in symptoms during TF-CBT treatment. Alternatively, this finding may relate to the finding that ER skill was not found to improve among the children in the current study, and thus restriction of range prevented a possible effect from being detected. ER skill measures the child's ability to express their emotions, both positive and negative, in adaptive and socially appropriate ways and demonstrate empathy. Unlike the other measures of ER used in the current study, this measure is not concerned with maladaptive behaviors. Maladaptive and adaptive ER may not be two ends of one continuum, but may be separate constructs that develop independently of each other. This hypothesis is supported by the fact that previous studies have found links between externalizing symptoms and maladaptive forms of ER but not ER skill (e.g., Kliewer et al., 2004). Further investigation into the relationship between maladaptive and adaptive forms of ER is an interesting area of future research.

Improvement in Emotion Regulation

As expected, children in the current study did reduce their use of maladaptive ER strategies over the course of TF-CBT treatment. There was no change in ER skill, an adaptive form of ER. It was somewhat surprising that none of the forms of ER improved consistently over all time periods and that the effect sizes were small. These results suggest that although children did improve in ER, the magnitude of change was limited. These findings are consistent with previous research looking at change in ER following psychological treatment. For example, some authors have reported improvement to ER following therapy (Suveg et al., 2009), whereas others have failed to find improvements in their samples (e.g., Moore & Russ, 2008). Finally, when improvement has been reported, small effect sizes are typical (e.g., Ford et al., 2012; Kley et al., 2012). It seems that overall, the interventions targeting ER have had only moderate success in improving this construct. It is important to remember that research has not been done on improvement in ER for all therapeutic approaches that endeavor to teach ER. Future research should begin by focusing on the therapeutic approaches that already exist.

Clinical Implications

The results of the current study suggest that TF-CBT decreases *maladaptive* forms of ER, and that these decreases are associated with symptom reduction. The results are consistent with the little work that has been done in this area. Suveg et al. (2009) also reported that only improvement in maladaptive forms of ER predicted improvement in anxiety scores in a CBT intervention. Similarly, improvements in maladaptive forms of ER have been reported to predict symptoms by Slee et al. (2008) and Kley et al. (2012). However, not all research is consistent with the notion that only improvement in maladaptive ER strategies impacts symptoms. Recent research demonstrated that ER skill might be one path by which children move from lability/negativity to fewer internalizing symptoms (Kim-Spoon et al., 2013). This suggests that teaching children

adaptive ER strategies may also have an impact on symptomatology. Taken together, these studies indicate that helping children to both *increase* adaptive and *decrease* maladaptive strategies may be the most effective way to impact symptom change. Whereas there is a wide range of therapeutic approaches that target ER, many interventions designed to improve ER have not directly measured this area of functioning (Bilek & Ehrenreich-May, 2012; Semple et al., 2010). These therapies provide an opportunity to expand this area of research. Studies should evaluate the different approaches and explore how improvements in both adaptive and maladaptive ER strategies impact child symptomatology.

Given the inclusion of ER skill-building within the TF-CBT model, it is perhaps surprising that larger improvements in ER were not found. Some children may have made relatively large improvements in ER whereas others did not improve at all. This would explain why improvements in ER predicted improvements in symptoms, despite overall small improvements in ER for the sample. There may not be enough follow-up after new ER strategies have being taught. The TF-CBT model recommends that therapists return to difficult concepts until the child demonstrates competence in that area. For many children, this means that only one session is devoted to each ER strategy. Whereas a child may develop competence in ER strategies within the supportive therapeutic environment, it may be much more difficult to gain competence in these skills outside of therapy. It may be unreasonable to expect that children will change their patterns of regulation after one or two sessions. This may also be true for parents, who can be taught to be effective ER coaches in session, but may have more difficulty transferring these skills into their everyday lives. Parents and children may need to process weekly real-life difficult emotional scenarios and receive feedback from therapists until all are confident that improvement in ER has occurred outside the therapy setting. Additionally, after termination families could be offered booster sessions targeting ER, as this might improve overall treatment success and the maintenance of therapeutic gains. Future research is needed investigating the impact of therapy enhancements such as these on improvement in ER.

Limitations

All variables were assessed through paper-and-pencil measures, which may be subject to biases. Whereas inclusion of both parent and child perspectives represents a strength of this study, and only children can integrate multiple levels of information about their own emotions, there are problems with questionnaires. Child-report is limited by children's awareness of and ability to monitor emotions, recall emotional experiences, and ability to communicate this information. Moreover, parent-report can be biased, for example, by parental psychopathology. Future research involving observational methods of measurement would complement the use of child- and parent-report.

Two other limitations were attrition and the inclusion of siblings in the sample. Whereas the attrition rate in this investigation may be considered high, it is consistent with other studies of child and family therapy (Kendall & Sugarman, 1997). Siblings were included in order to maximize sample size. Inclusion of siblings in research samples can be problematic because there is shared variance among siblings that is not present among other participants. However, it is important to note that results did not change when siblings were excluded from analyses.

Taken together with the extant literature the current study suggests that more work needs to be done to ensure that ER education is maximally effective for children. Consistent with previous research the current study found small effect sizes for improvement in maladaptive ER. This suggests that current interventions targeting ER could be improved, and/or the more effective means to improvement in ER are not being studied. More research is needed to understand the best ways to increase the magnitude of improvement in ER throughout clinical intervention. Once treatments are tailored to reliably produce greater improvement in ER, researchers will have a better platform from which to examine how improvement in ER predicts improvement in symptoms. Improvement in ER throughout therapy and its effects on symptom outcome represents an exciting new area of investigation.

Acknowledgements

The authors acknowledge the following children's mental health centres for their participation in this clinical research study: Aisling Discoveries Child and Family Centre, Boost Child Abuse Prevention & Intervention, Child Development Institute, COSTI Family and Mental Health Services, The Etobicoke Children's Centre, The Hincks-Dellcrest Treatment Centre (Sheppard Site), The Hincks-Dellcrest Treatment Centre (Jarvis Site), Yorktown Child and Family Centre, and Peel Children's Centre.

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