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Managing Frustration for Children (MFC) Group Intervention for ADHD: An Open Trial of a Novel Group Intervention for Deficient Emotion Regulation

Paul J. Rosen, Kirsten D. Leaberry, Kelly Slaughter, Nicholas D. Fogleman, *University of Louisville*
Danielle M. Walerius, *University of Louisville and Nationwide Children's Hospital, Columbus, OH*
Richard E.A. Loren, Jeffery N. Epstein, *Cincinnati Children's Hospital Medical Center*

Deficient emotion regulation is a common and impairing area of difficulty among children with ADHD. Few interventions specifically address deficient emotion regulation. The Managing Frustration for Children With ADHD (MFC) group treatment was developed to specifically target deficient emotion regulation deficits common to children with ADHD. The MFC was developed as a 12-week multisystemic intervention for emotion regulation deficits among children with ADHD. An open trial assessed the effectiveness of the MFC as an adjunctive treatment for deficient emotion regulation among children with ADHD. Fifty-two children with ADHD ages 9–11 (42 boys, 10 girls) were enrolled in the MFC, with 44 completing treatment. The majority (71.2%) of participants had at least one comorbid internalizing, externalizing, or learning disorder. Intent-to-treat repeated-measures ANCOVA suggested significant decreases in emotion regulation deficits, mood difficulties, and externalizing difficulties following completion of treatment. More than half (53%) of children who completed treatment experienced reliable and clinically significant improvement in at least one area of functioning. The MFC demonstrated promising initial effectiveness in addressing the emotion regulation deficits of children with ADHD.

Dylan, age 9, is at the dining room table studying for a spelling test. He is worried because he did not do well on the last test. As he is studying, his little brother comes into the room and asks Dylan to play with him. Dylan is focusing on the test and tries to ignore his brother, but his brother keeps trying to get Dylan's attention. Dylan feels like his brother is trying to annoy him on purpose. He starts to get physically tense, he grits his teeth, his heart begins to race, and his face turns red. Thoughts start to flash in his head: "He will never stop bothering me," "He's trying to get me in trouble," "He always does this." He becomes extremely frustrated, angry, and upset. He pushes his brother down and screams "LEAVE ME ALONE!" His little brother starts crying, attracting the attention of their mother, who scolds Dylan for attacking his brother and grounds him for the next three days.

While the preceding vignette is fictional, the scenario experienced by "Dylan" is a regular occurrence for many children with attention-deficit/hyperactivity disorder (ADHD). Children with ADHD are at an elevated risk for emotion regulation difficulties, with estimates indicating that 30%–40% of children with ADHD experience significant and impairing emotion regulation difficulties

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(Shaw, Stringaris, Nigg, & Leibenluft, 2014). Emotion regulation difficulties have been linked to a host of negative outcomes among children with ADHD, including greater emotional, behavioral, social, and functional impairment and higher rates of comorbid internalizing and externalizing disorders (Shaw et al., 2014). Despite the pervasive and impairing impact of emotion regulation difficulties, there are currently few (if any) evidence-based interventions for emotion regulation difficulties in children with ADHD (Fernandes, Tan-Mansukhani, & Essau, 2017)

Theoretical Basis of Treatment Development

Emotion regulation describes a set of continuous, multisystemic processes by which individuals control and modify the valence and intensity of their emotional states to adapt to internal and external demands (Cole, Martin, & Dennis, 2004; Gross, 2002). Several models illustrate the complex and multisystemic nature of emotion regulation. Porges' (2001) polyvagal model describes emotion regulation according to reactivity and regulation of the autonomic nervous system, while Gross (2002) describes a cognitive-based model of emotion and regulation where-by reactivity and regulation "upstream" has implications for "downstream" emotional and behavioral response. Gross (2002) notes that "upstream" cognitive strategies such as reappraisal and reallocation of attention are more effective at modulating mood and inhibiting reactivity than "downstream" strategies such as response

suppression. Zeman and colleagues (p. 159, 2006) also note that peers, parents, and others “exert important socializing influences on children’s emotional expressivity.” There is recognition across multiple theories that emotion dysregulation may result from maladaptive reactivity, deficient regulation of aroused emotions, or an interaction of the two (Bauer, Quas, & Boyce, 2002), and that emotion dysregulation often results in maladaptive, emotionally driven behavior. Indeed, as demonstrated by “Dylan,” there is likely an interaction of these systems such that physiological arousal (i.e., physically tense, gritting teeth, accelerated heartrate) fuels and is fueled by cognitive attributions (“He’s trying to get me in trouble,” “He always does this”), escalating the emotion reactivity until it culminates in a maladaptive and emotionally driven behavior (i.e., pushing his brother). Given the multisystemic nature and multiple valid models of emotion regulation, it is essential that any treatment address emotion regulation difficulties on the physiological, cognitive, and sociobehavioral levels.

Emotion Regulation as a Clinical Area of Impairment Among Children With ADHD

Deficient emotion regulation is a robust and treatment-resistant difficulty among children with ADHD (Shaw et al., 2014). Children with ADHD experience greater emotional distress (Strine et al., 2006), emotional intensity (Barkley, 1997), and frequent and intense negative emotion reactivity (Walcott & Landau, 2004) than children without ADHD. However, not all children with ADHD experience clinically significant difficulties with emotion regulation. A recent review by Shaw and colleagues (2014) reported “prevalence estimates of emotion dysregulation of 24 to 50%” (p. 277) among children with ADHD. Indeed, studies have increasingly suggested that there is significant heterogeneity within ADHD (Musser, Galloway-Long, Frick, & Nigg, 2013) such that a subset of children with ADHD experience significantly greater emotion dysregulation than typical children with ADHD (Factor, Reyes, & Rosen, 2014; Karalunas et al., 2014).

Deficient emotion regulation has been linked to a broad range of impairments in children with ADHD, including greater emotional problems, behavioral problems, family difficulties, and functional impairment (Rosen, Walerius, Fogleman, & Factor, 2015; Shaw et al., 2014; Walerius, Reyes, Rosen, & Factor, 2014). Evidence increasingly suggests that deficient emotion regulation contributes to the high rates of comorbidity and functional impairment in children with ADHD (Anastopoulos et al., 2011; Seymour, Chronis-Tuscano, Iwamoto, Kurdziel, & MacPherson, 2014). Several recent studies have even suggested that deficient emotion regulation accounts for the frequency of internalizing and externalizing problems in children with ADHD, and that children

with ADHD and intact emotion regulation look no different from their typically developing peers across emotional and behavioral domains (Anastopoulos et al., 2011; Karalunas et al., 2014; Leaberry, Rosen, Fogleman, Walerius, & Slaughter, 2017).

Lack of Treatment Options for Deficient Emotion Regulation in Children With ADHD

Despite the clear and convincing evidence of the negative impact of deficient emotion regulation, no treatment has been developed to date to specifically target deficient emotion regulation in children with ADHD (Shaw et al., 2014). Fernandes and colleagues (2017, p. 122) noted in a recent review that “(consideration of) emotion regulation in ADHD treatment has been challenging ... due to the fact that studies have measured emotional changes as a secondary outcome.” Indeed, the primary treatment approaches for ADHD (i.e., stimulant medication and behavioral parent training) are primarily oriented towards the treatment of core diagnostic symptoms (inattention, hyperactivity, and impulsivity) and/or disruptive behavior. While these approaches have demonstrated strong efficacy in the treatment of the core attentional and behavioral symptoms in children with ADHD (Pelham & Fabiano, 2008), studies have been equivocal regarding the efficacy of either approach regarding emotion dysregulation (Kratovich et al., 2007; Shaw et al., 2014). This is particularly notable given that emotional reactivity and regulation can both moderate (Bagner et al., 2012) and mediate (Gatzke-Kopp, Greenberg, & Bierman, 2013) children’s responsiveness to psychosocial interventions. Hannesdottir and Ollendick (2007) identified emotion dysregulation as a difficulty that can interfere with and reduce the impact of interventions for children across a range of disorders including ADHD.

It is clear that emotion regulation is an area of critical importance for children with ADHD; however, emotion regulation is not explicitly addressed in any well-established evidence-based treatment protocols for children with ADHD (Shaw et al., 2014). Given the substantial clinical impairment of children like “Dylan” and the lack of resources for treating the deficient emotion regulation of children with ADHD, it was clear that there was an urgent and pressing need for development of an intervention to specifically target emotion regulation difficulties among children with ADHD.

Developing the Managing Frustration for Children With ADHD Group Treatment for Deficient Emotion Regulation

Rationale for Treatment

We developed the Managing Frustration for Children (MFC) with ADHD group treatment to specifically target the deficient emotion regulation that is common to

children with ADHD like “Dylan.” Unlike other well-established pharmacological and psychosocial treatments for ADHD that treat emotion as a secondary outcome (Fernandes et al., 2017), the MFC was developed specifically to address emotion regulation as the primary focus and outcome of treatment. Accordingly, the treatment was developed to focus primarily on improving emotion regulation rather than the core neurological or behavioral symptoms of ADHD. Similarly, the MFC was developed using an integrated and multisystemic theoretical model of emotion regulation. To our knowledge, the MFC will thus be the first treatment developed specifically to address deficient emotion regulation in children with ADHD.

The complex, multifaceted, and multisystemic nature of emotion regulation indicated that an intervention needs to target emotion regulation at the physiological, cognitive, behavioral, and social levels to be effective at comprehensively addressing the emotion regulation deficits of children with ADHD (Shaw et al., 2014), while the socioemotional and sociobehavioral nature of emotion regulation suggested that a group treatment approach would be appropriate (Zeman, Cassano, Perry-Parrish, & Stegall, 2006). Accordingly, the MFC was developed using a multisystemic framework to address the complex needs of emotionally dysregulated children with ADHD. Gross’ (2002) process model suggests that while antecedent-focused strategies are more effective than response-focused strategies in downregulating negative emotion,

use of antecedent-focused cognitive strategies is more difficult in situations of higher emotional intensity (Sheppes & Gross, 2011) given the tendency for strong emotional distress to override cognitive control and enable impulsive emotionally driven behavior (Tice, Bratslavsky, & Baumeister, 2001). Accordingly, the MFC was developed using a “bottom-up” model (see Figure 1) that focused on response-focused behavioral strategies (i.e., coping with immediate emotional and behavioral needs) in the initial stages before moving to more complex antecedent-focused cognitive strategies (i.e., emotion recognition, restructuring emotional vs. rational cognitions, recognizing and avoiding emotional triggers) in later sessions. This “bottom-up” model sought to provide children with easily accessible behavioral coping strategies to allow them to reduce acute emotional intensity and better inhibit maladaptive emotional responding and emotionally driven behavior in the short term, with these gains then reinforced through instruction in antecedent-focused cognitive strategies to improve overall regulation of negative emotions over time.

Treatment Structure

The MFC consists of 12 weekly group sessions and is designed for groups of 5 to 8 children. Children attend 11 sessions (Sessions 1–5 and 7–12), while Session 6 is designed as a parent information session—a detailed description of the session content is in the following section (see Table 2a). The MFC is a sequential treatment with earlier sessions laying the foundation for later

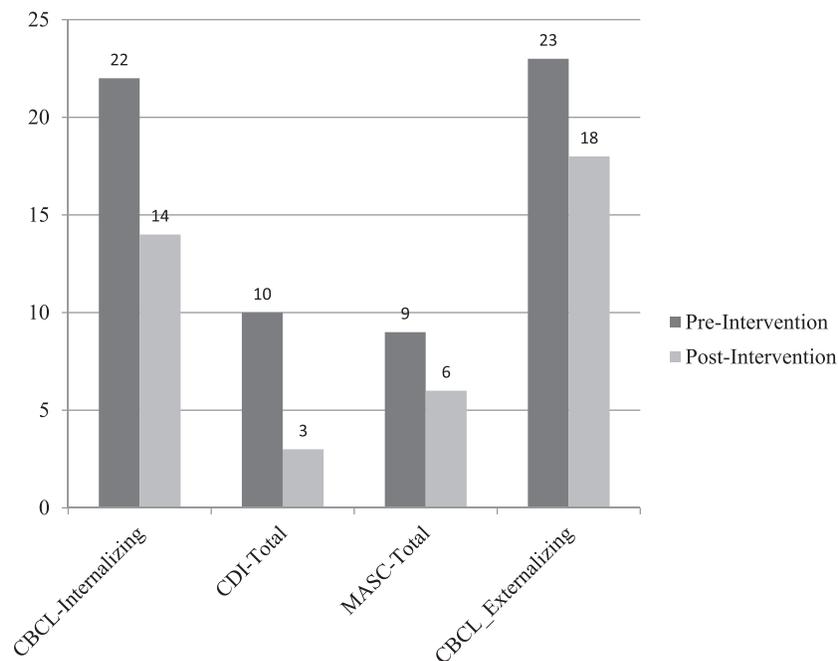


Figure 1. Participants in clinical range ($T \geq 65$) of measures pre-and post-intervention for participants who completed intervention. Note. $N = 44$

sessions, thus all children must be enrolled in the group prior to the first session and are expected to attend all 11 sessions, if possible. All sessions are co-run by two therapists and a behavior tracker. All child group sessions last 90 minutes with a brief break midway through each session for children to receive a snack. Parents are not present during the child treatment sessions, although parents are given handouts each week that provide in-depth discussion of that week's treatment topic, exercises and activities to help parents better understand the topic, and suggestions for parent-child activities at home to reinforce emotion regulation skills taught in the child sessions. The term "frustration" is used in both child and parent materials as a proxy for deficient emotion regulation, as an informal focus group suggested that parents and children were less likely to be familiar with the concepts of "emotion regulation" or "emotion dysregulation." Indeed, Seymour and Miller (2017) describe poor frustration tolerance as a probable mechanism underlying the emotion regulation difficulties of children with ADHD.

Each child group session consists of several discrete sections: (1) review of group rules and the previous week's skill; (2) discussion and instruction of new skills; (3) activities to help children learn and practice new skills; and (4) homework assignments to reinforce skill acquisition at home. Given that children with ADHD often exhibit challenging behavior in social settings that can interfere with learning, a behavior tracking system is implemented during group sessions to help children with ADHD behave appropriately during the group sessions (see Table 2b). Children are notified by a therapist of all instances of behaviors in three positive behavioral categories (participation, following directions, and ignoring negative behavior) and five negative behavioral categories (interruptions, off-task behavior, out-of-seat behavior, disrespectful behavior, noncompliance) common to children with ADHD (Abikoff et al., 2002), and each instance of positive or negative behavior is recorded by a behavior tracker. Children are given individualized behavioral goals for each session with an opportunity to earn rewards for meeting all behavioral goals. Behavior tracking systems have consistently demonstrated efficacy at minimizing disruptive, aggressive, and inappropriate behavior and improving attention and performance among children with ADHD in group settings (Pelham & Fabiano, 2008). Additionally, the highest performing children in each session were given awards at the end of each session to promote prosocial behavior and further reinforce the behavior management system. However, the behavior tracking system was only intended to encourage appropriate behavior in group sessions to allow children to receive all therapeutic information, it was *not* intended as an active intervention for children's behavior outside of the therapy setting.

Treatment Development

As previously discussed, the MFC was developed using a "bottom-up" approach. Early sessions (Sessions 1–5) of the MFC focused on immediate intervention for acute dysregulated emotional reactivity and distress by helping children develop effective emotional and behavioral coping strategies, while later sessions (Sessions 7–12) focused on training children in the more cognitively driven proximal "upstream" strategies that are most effective for overall regulation of emotions (Gross & John, 2003). As previously mentioned, Session 6 was a parent information session that was not attended by children.

Sessions 1–2 focused primarily on orienting children to the group, providing psychoeducation about the nature of emotion regulation, and instructing children in the inhibition of emotionally driven negative behavior and impulsive responding to emotional distress. Common (i.e., siblings, schoolwork, teasing, disappointment) and idiographic areas of frustration were discussed to destigmatize the experience of frustration. Children were instructed in problem-solving strategies to help them learn to inhibit initial reactivity and improve effortful control in emotionally arousing situations. Problem solving is a well-established cognitive-behavioral intervention that is common to many interventions for children with ADHD, emotional difficulties, and/or behavior difficulties (e.g., Barkley, 2014; Kazdin, 2010; Weisz et al., 1999), it was employed in the MFC primarily to help children learn to inhibit initial emotional-driven behavioral responding to emotional distress to allow for activation of subdominant prosocial responding. Children were assigned homework to complete problem-solving activities with their parents to assist in generalization of skills to the home setting.

Sessions 3–5 focused on learning, practicing, and reinforcing skills for regulating emotional distress. Given the multisystemic nature of emotion regulation, children were trained in cognitive, behavioral, and physiological approaches to regulating negative emotional arousal and coping with emotional distress. Cognitive coping skills focused on "self-coaching" to help children actively engage emotion regulation skills and introduce the concept of cognitive reattribution. Specifically, children were taught to identify emotional distress (e.g., "I am starting to get upset"), consider the consequences of dysregulated emotional reactivity (e.g., "I may get myself in trouble if I get too frustrated"), encourage themselves to engage coping skills (e.g., "I can handle this and help myself calm down"), and reframe situations (e.g., "He/she probably did not mean to be mean to me"). Behavioral coping skills focused on developing a "toolbox" of skills across a range of domains (physical activity, creative activities, social activities, relaxing

activities; Fristad, Arnold, & Leffler, 2011). Children were encouraged to tailor the activities toward their particular interests. Physiological relaxation skills focused on relieving physiological indicators of emotional distress through use of controlled breathing techniques and age-appropriate muscle tense-release and stretch-based activities (Hannesdottir & Ollendick, 2007). Coping skills were introduced in Session 3 and reinforced through in vivo practice activities in Sessions 3–5, including an analog teasing task (Larson & Lochman, 2010), completion of a frustrating blocked-goal performance activity, and live-action role-plays. Children were encouraged throughout all activities to use multiple (cognitive, physiological, and behavioral) coping strategies and to self-monitor their emotional states. Children were given homework assignments to develop a coping skills “toolbox” and complete emotion regulation activities at home with their parents to promote generalization of coping skills to the home.

Session 6 was conducted exclusively with parents of group participants (children did not attend). The parent session lasted 120 minutes and consisted of didactic presentation of skills and topics covered in all child sessions, didactic instruction in at-home techniques for managing children’s emotion regulation difficulties, and individual feedback regarding child’s progress in group sessions and at home.

Sessions 7–8 focused on cognitive and physiological emotion recognition. Studies indicate that children with ADHD and emotion deficit regulation deficits often have difficulty identifying their own emotional states (Zeman et al., 2006), and that poor emotion recognition is linked to greater emotional reactivity and emotionally driven behavior among children with ADHD (Factor, Rosen, & Reyes, 2013). Children were taught to identify common cognitions that would likely produce frustration and emotional distress as “BEAR Thoughts” (Blaming, Exaggerating, Assuming the worst, Reacting), to challenge these “BEAR Thoughts” by examining supportive and unsupportive evidence, to develop more realistic “coping thoughts” to counteract the “BEAR Thoughts” and reappraise the situation (“BEAR Thoughts” adapted from Weisz et al., 1999).

Sessions 9–11 focused primarily on antecedent-based coping, in accordance with Gross’ process model and evidence that antecedent-focused coping is highly effective at reducing and regulating emotional distress (e.g., Gross, 1998, 2002). Specifically, Sessions 9–11 focused on helping children make reattributions in negative emotionally arousing situations, understand the importance of using contextual clues to understand and anticipate the emotions, perspectives, and behaviors of others, identify and avoid triggers for emotional distress, and understand how environmental factors contribute to frustration and emotional reactivity.

Session 12 focused primarily on reinforcing the material in the MFC and discussing ways to continue using skills learned in MFC after completing the group, as well as a wrap-up and graduation ceremony for children. Children were encouraged to make brief “movies” demonstrating how appropriate use of coping skills led to effective rather than emotionally driven behavior. Finally, children were given graduation certificates to commemorate their accomplishments in completing the group intervention.

Research Questions

The present study represents an open trial of MFC with ADHD group treatment. Given the transdiagnostic nature of emotion dysregulation and research suggesting that emotion dysregulation is a key component of both internalizing and externalizing difficulties in children (Eisenberg et al., 2009), we hypothesized that completion of the MFC would lead to reductions in emotional reactivity, internalizing problems, and externalizing problems in children with ADHD. We also posited exploratory hypotheses regarding the impact of age and sex on response to the treatment. However, given the exploratory nature of these hypotheses, we did not make any specific predictions regarding the impact of sex or age on treatment response.

Methods

Participants

Participants in the open trial of the Managing Frustration for Children with ADHD (MFC) group treatment were self-referred or referred by physical and mental health practitioners (pediatricians, psychiatrists, psychologists, social workers) and school personnel (teachers, school counselors) to treatment at an academic medical center in a mid-sized midwestern city. Fifty-two children ages 9–11 (42 boys, 10 girls) with ADHD were enrolled into nine treatment groups consisting of 5–8 children each (see Table 1). The ethnicity of the sample was reflective of the area from which the population was drawn (82.7% Caucasian/European-American, 15.4% African-American, 1.9% Biracial; US Census Bureau, 2011). The present study was conducted through chart review of participants in the MFC, thus reporting of procedures follows the Recording of studies Conducted using Observational Routinely-Collected Data (RECORD) adaptation of the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines for open trial studies (Benchimol et al., 2015).

To be included in treatment, children had to (a) be between the ages of 9 and 11, (b) have a preexisting, clinically established diagnosis of ADHD, and (c) meet criteria for clinically significant impairment in at least one domain of the Impairment Rating Scale (IRS; Fabiano

Table 1
Demographic Characteristics Of Intent-to-Treat Sample

Demographic Characteristic	<i>N</i> = 52
Age (Mean ± SD)	9.84 ± 0.78
Gender (Male)	42 (80.8%)
Self-Identified Racial/Ethnic Background	
White/European-American	43 (82.7%)
Black/African-American	8 (15.4%)
Biracial/Multiracial/Other	1 (1.9%)
ADHD Subtype	
ADHD-Predominantly Inattentive	9 (17.3%)
ADHD-Combined	43 (82.7%)
# of Diagnoses (Mean ± SD)	2.06 ± .87
Comorbid diagnosis (Yes)	37 (71.2%)
Behavioral Disorder	15 (28.8%)
Mood Disorder	13 (25.0%)
Anxiety Disorder	16 (30.8%)
Learning Disorder	10 (19.2%)
Active Medication Treatment (Yes)	46 (88.5%)
Multiple Medications (Yes)	22 (42.3%)
# of Medications (Mean ± SD)	1.48 ± 1.03

et al., 2006). Exclusion criteria included (a) preexisting diagnosis of autism spectrum disorders, (b) history of psychosis within the past 6 months, (c) suspected or confirmed intellectual disability, (d) significant visual or hearing impairment that would prevent the child from being able to access visual or auditory information, and (e) child refusal to meet with or speak with the group therapist during the intake, as this indicated that the child was likely to have significant difficulty adapting to the group setting. The MFC was administered as a clinical treatment within an academic medical center, families were screened by phone by a general intake office and then referred to the MFC if they qualified and were

interested. Because of this intake procedure, data were not available for how many participants were excluded or declined to be screened. This is consistent with the RECORD guidelines (Benchimol et al., 2015).

Participants included children with either ADHD–Predominantly Inattentive Type (*N* = 9) or ADHD–Combined Type (*N* = 43). All children in the study had previously received a diagnosis of ADHD by a community-based clinical provider. Diagnoses were confirmed using a standard diagnostic battery consisting of a semistructured interview with parents and completion of parent- and teacher-report questionnaires. Many of the children in the study also had preexisting comorbid behavior (*n* = 15), mood (*n* = 13), anxiety (*n* = 16) and/or learning (*n* = 10) disorders. Indeed, the modal number of diagnoses among children enrolled in the open trial was two (*n* = 22). Children were allowed to continue on medication while participating in the MFC, with 47 of 52 children receiving concurrent medication treatment for ADHD (42 of the 47 children were receiving stimulant medication treatment, 5 of the 47 children were receiving nonstimulant medication for ADHD). Many children (22 of 52; 42.3%) in the study were also receiving additional concurrent psychotropic medication treatment (*M* number of medications = 1.48, *SD* = 1.03). Forty-four of the 52 children who completed the initial intake for the MFC completed the treatment protocol. Reason for failure to complete treatment was not assessed in the current study. Results of a one-way ANOVA indicated that children who did not complete the group had greater levels of parent-reported internalizing problems on the Child Behavioral Checklist (CBCL; Achenbach, 2009) when assessed prior to the intervention ($F[1, 50] = 4.42, p < .05$; *M* completers CBCL-I = 63.32 T; *M* non-completers CBCL-I = 70.00 T). No other significant differences were observed between children who

Table 2a
Session content of Managing Frustration for Children With ADHD (MFC) by Week

Session	Session Topic	Activities
Session 1	Introduction; Similarities & Differences	Partner interview, ambiguous picture game, telephone game
Session 2	Problem solving	Problem solving steps, problem solving collaborative puzzle game
Session 3	Coping skills: Introduction	Managing frustration puppet analog teasing activity
Session 4	Coping skills: Flexibility and “getting stuck”	Ambiguous rules Lego activity
Session 5	Coping skills: Real life applications	Role-play activities
Session 6	Parent Information Session	Review of group and one-on-one meetings
Session 7	Emotion recognition: Physiological cues	Emotion charades, relaxation training
Session 8	Emotion recognition: Cognitive cues	“BEAR” thoughts, role-play activities
Session 9	Emotion recognition: Cognitive cues (continued); Perspective taking and attributions	Coping thoughts contest, Ambiguous picture activity
Session 10	Choices and consequences	Choices and consequences quiz game
Session 11	Putting it all together: Cascade of frustration model	Role-play activities
Session 12	Graduation	Mini movies

Table 2b
Behavioral Tracking System Codes and Definitions

Code	Definition
Participation	Child raises hand and contributes appropriately to group discussion/activity.
Interruption	Child speaks during group discussion without raising hand and being called on by group leader.
Off-task	Child does not participate in group activity, engages in extraneous activity during activity or discussion, fails to attend to discussion, or makes verbal utterance during discussion that is not relevant to topic of discussion.
Out of Seat	Child's body is not in contact with seat of chair without permission of leader
Disrespect	Child makes comment or behavior that is rude, demeaning, or insulting to another child or group leader
Following Directions	Child attempts to comply with direct command within 10 seconds
Ignoring Negative Behavior	Child does not respond negatively when another child engages in disrespectful behavior directed at the child (this code is only used after an instance of Disrespect).

completed the group and children who failed to complete the group on any demographic or dependent variable included in analyses in this study.

Measures

ADHD diagnosis was confirmed using a semistructured diagnostic interview and the parent- and teacher-report versions of the Vanderbilt ADHD Rating Scale (VARDS; Wolraich et al., 2003). Response to treatment was assessed with well-established parent- and child-reported questionnaires of emotional and behavioral functioning. The Emotion Regulation Scale for Children (ERC; Shields & Cicchetti, 1997), a 24-item parent-report measure, was used to assess parent perceptions of emotion regulation difficulties in their children. The CBCL (Achenbach, 2009), a 113-item parent-report measure, was used to assess parent's perceptions of internalizing and externalizing difficulties in their children. The Children's Depression Inventory-2nd Edition (CDI; Kovacs, 1992), a 27-item child-report measure, was used to assess children's depressive symptoms and negative emotional experiences. The Multidimensional Anxiety Scale for Children (MASC; March, Sullivan, & Parker, 1999), a 39 item child-report measure was used to assess children's perceptions of their anxiety. All measures in this study have demonstrated substantial reliability and validity across a range of studies and populations and stability over a 6-month period (Achenbach, 2009; Biederman et al., 2001; Kovacs, 1992; March et al., 1999; Rosen, Milich, & Harris, 2012; Shields & Cicchetti, 1997), suggesting that change on the measures from pre- to postintervention were unlikely to occur as an effect of time or maturation. All measures in this study (except the ERC) have been clinically normed, have published reliability, and provided T-scores normed for age and sex. T-scores of 65 or greater are considered to be clinically significant on the CBCL, CDI, and MASC. Reliability of the ERC in the current study was excellent ($\alpha = .86$), although it has not been normed for clinical use and thus does not have a clinical cut-off.

Procedure

Parents and children met with one of the two group leaders for an initial intake assessment prior to group to determine if they met inclusion and exclusion criteria. Children were enrolled in group consecutively until all potential slots (maximum of 8) in the group intervention were full. Parents and children completed group measures prior to the initiation of the group intervention. Parents completed all postintervention measures following Session 11 while children completed all postintervention measures during the final group session. This procedure was selected (as opposed to completing measures following the final session) to ensure the best possible rate of completion of measures, and was appropriate given that the final session consisted primarily of review and a graduation ceremony rather than presentation of any new intervention material. The group intervention was administered according to a manualized treatment approach, with all sessions administered in the order specified in the "Treatment Development" section. To ensure fidelity to the treatment, one of the contributing authors of the treatment manual served as a therapist for each group included in the current study. The primary author of this study and the treatment manual served as a group leader for the first four groups, and ran two of the groups with a contributing author to this study and the treatment manual serving as a co-leader for two of the group administrations. The contributing author then served as one of the group leaders for all additional group administrations.

Statistical Analytic Plan

An intent-to-treat design was used for all analyses. Last-observation carry-forward was selected to account for missing data and intervention noncompleters, which meant that pre-intervention assessment scores were replicated at the postintervention assessment interval for all participants that failed to complete the intervention. Last-observation carry-forward was selected as the most conservative test of participant improvement given the preliminary nature of this study. Repeated measures

ANOVA was selected to assess for changes between pre- and postintervention assessments on outcome measures (see Figure 1) and to allow for examination of potential effects of age and sex on response to treatment. A Greenhouse-Geisser correction was applied to all analyses to correct for violations of sphericity. Sex and age were entered as between-subjects variables and results examined all 2- and 3-way interactions between intervention response and these variables. Cohen's f was used as a measure of local effect size in the context of a repeated measures ANOVA with covariates.

Preliminary clinical change analyses were conducted on all measures in the study that contained published norms. The CBCL, CDI, and MASC are normed on a T-distribution, whereby a score of 65 or greater is considered to indicate a clinically significant difficulty. Clinical change analyses examined how many children demonstrated improvement or deterioration over the course of treatment, Reliable Change Index (RCI) scores were also calculated using the procedure outlined by Jacobson and colleagues (1999). Clinical change analyses were only conducted on the 34 of the 44 children who completed the group treatment that were in the clinical range on at least one indicator of internalizing or externalizing difficulties (i.e., CBCL, CDI, MASC; many children were in the clinically significant range on more than one indicator).

Results

Emotion Regulation

Results indicated a significant impact of the intervention on ERC scores, $F(1, 45) = 6.13, p = .01$, Cohen's $f = .37$ [pre-intervention ("pre") *marginal M (SE) = 2.41 (.06)* postintervention ("post") *marginal M (SE) = 2.25 (.07)*] with no significant 2- or 3-way interactions (See Table 3). Thirteen children demonstrated change greater than the RCI of 0.33, with one child demonstrating deterioration greater than the RCI. Clinical normalization could not be assessed as the ERC has not been normed.

Internalizing Behaviors

Results suggested that children's parent-reported internalizing problems and child-reported depressive

symptoms and negative emotion significantly decreased over the course of treatment; CBCL-Internalizing scores, $F(1, 45) = 12.76, p = .001$, Cohen's $f = .53$ [pre *marginal M (SE) = 64.00 (1.63)*, post *marginal M (SE) = 59.56 (1.74)*]. CDI-2 scores, $F(1, 45) = 10.97, p < .005$, Cohen's $f = .50$ [pre *marginal M (SE) = 58.49 (2.06)*, post *marginal M (SE) = 50.97 (2.09)*]. There was a significant interaction of sex and the intervention on CBCL Internalizing scores, $F(1, 45) = 4.33, p < .05$, Cohen's $f = .31$, such that males demonstrated a greater response to the intervention than females. There were no other significant 2- or 3-way interactions (see Table 3). Thirteen children demonstrated change on the CBCL greater than the RCI of 7.14 (with 1 child demonstrating deterioration), with 6 of these children moving from the clinically significant range to the nonclinical range. Ten children demonstrated reliable change on the CDI using an RCI of 11.23 with 1 child deteriorating, 7 of these children improved from the clinically significant range to the nonclinical range. There was no impact of the intervention on children's report of anxiety symptoms, $F(1, 45) = 0.01, p > .90$, Cohen's $f = .00$.

Externalizing Behaviors

There was a significant impact of the MFC on CBCL-Externalizing scores, $F(1, 45) = 10.93, p < .005$, Cohen's $f = .53$ [pre *marginal M (SE) = 67.12 (1.68)* post *marginal M (SE) = 63.57 (1.81)*]. There were no significant 2- or 3-way interactions (see Table 3). Ten children demonstrated reliable reduction in scores using an RCI of 5.93 with 1 child deteriorating. Five of these children were no longer in the clinically significant range at the end of the treatment.

Reliable and Clinically Significant Change

Overall, 18 of the 34 children (53%) that were in the clinically significant range on at least one indicator experienced reliable and clinically significant improvement on at least one indicator that resulted in their score decreasing from the clinically significant range to the nonclinically significant range with the reduction greater than the RCI for that measure.

Table 3

Repeated-Measures Analyses of Covariance of Pre-Post Intervention Change for All Outcome Variables

Variable	Pre-Intervention Mean (SE)	Post-Intervention Mean (SE)	Sum of Squares	Df	F	Cohen's f
Emotion Regulation Checklist - Total	2.41 (0.06)	2.25 (0.07)	0.20	1, 45	6.13**	.37
CBCL-Internalizing	64.00 (1.63)	59.56 (1.74)	216.36	1, 45	12.76***	.53
CDI-Total	58.49 (2.06)	50.97 (2.09)	676.89	1, 45	10.97**	.50
MASC-Total	53.68 (2.30)	53.59 (2.33)	0.11	1, 45	0.01	.01
CBCL-Externalizing	67.12 (1.68)	63.57 (1.81)	173.58	1, 45	10.93***	.50

Note. $N = 52$. * $p < .05$, ** $p < .01$, *** $p < .005$. Mean Squares is equivalent to Sum of Squares as there is only 1 degree of freedom per analysis.

Case Presentation

“Kirk” was a 9-year-old White male in the third grade. Kirk lived with his mother, step-father, and older sister, and he had no contact with his father. Kirk had previously been diagnosed by his pediatrician with ADHD–Combined Type and Oppositional Defiant Disorder (ODD). These diagnoses were confirmed by clinical interview and the VADPRS and VADTRS (Parent: 9 of 9 inattentive, 8 of 9 hyperactive/impulsive, and 8 of 8 ODD symptoms; Teacher: 9 of 9 inattentive, 6 of 9 hyperactive/impulsive, and 5 of 8 ODD symptoms). Kirk was taking 20 mg/day of Adderall XR and 1 mg/day of Intuniv for ADHD and related difficulties, he had no prior history of psychosocial treatment before the MFC. The community practitioner and his mother both reported concerns regarding frustration, emotional reactivity, and self-esteem; the practitioner also noted concern about possible depressive symptoms. Kirk also had a history of significant “explosions” characterized by yelling, negative self-statements (e.g., “I hate my life,” “I can’t do anything right”), and occasional destruction of property when frustrated. These occurred most commonly when he received correction, was unable to complete tasks successfully, was unable to get something he wanted, or was required to make abrupt or unexpected transitions between activities. Pre-group parent-report ratings indicated clinically significant behavior problems (CBCL-Externalizing T score = 70) and emotional difficulties (CBCL-Internalizing T score = 66), child-report ratings indicated depressive symptoms that were slightly below the cut-off for clinical significance (CDI Total T score = 63) and minimal anxiety (MASC Total T score = 48). Kirk acknowledged frequent anger and frustration toward his parents and sister. He reported that when he was frustrated, “it burns inside,” and was unable to identify any successful coping skills prior to starting the MFC.

Kirk attended 10 of the 11 child sessions of the MFC, his mother attended the parent session in Week 6. Kirk was an active and engaged participant in the MFC. Kirk demonstrated considerable behavioral variability with frequent interruptions in the early sessions, but his behavior improved when given a specific behavioral goal as his rates of specifically targeted behaviors (i.e., interruptions) typically declined when linked to reinforcers (i.e., prizes). Kirk initially demonstrated significant frustration (e.g., rolling eyes, sighing, protesting) whenever he was not called on or was corrected for inappropriate behavior, but as the group progressed Kirk appeared better able to control his reactivity and occasionally was able to verbally coach himself on use of his coping skills. Kirk was given a time-out during the analogue teasing task in Week 3 for repeatedly teasing another child about his physical appearance, although he

was able to deescalate in time-out and was remorseful afterwards. Kirk became distressed during the blocked goal task in Week 4 and requested to use the Cool Down spot, where he was successfully able to use physiological relaxation exercises to calm down. Kirk participated frequently in group discussions and activities, but required occasional redirection to task. Kirk was inconsistent in returning his homework assignments, but his mother reported that she attempted to help him use his skills at home. Kirk and his mother described particular success in his use of relaxation skills (i.e., deep-breathing, tense-release muscle relaxation) and positive activities (e.g., basketball, drawing) to reduce frustration and negative mood. Following group, Kirk demonstrated reliable and clinically significant reductions in internalizing symptoms (CBCL-Internalizing T score = 54, CDI T score = 51). His mother reported that he was still experiencing clinically significant, albeit slightly reduced, rates of behavior problems (CBCL-Externalizing T score = 66). His ERC score also demonstrated reliable and significant change, reducing from 2.79 at the start of the MFC to 2.22 post-MFC. Overall, Kirk and his mother both reported that he enjoyed the group, and his mother reported that he was less reactive and was coping better with distress at the end of the group.

Discussion

The results of this open trial suggested that children who completed the MFC experienced significant decreases in internalizing, externalizing, and emotion-regulation-related difficulties, with over half of the children who were in the clinical range in at least one area of impairment experiencing reliable and clinically significant reductions so that they were at normative levels in that same area following treatment. This is particularly notable as this was a multiply-impaired sample of children who were experiencing significant pre-intervention impairment even though the majority were receiving medication treatment prior to enrolling in the intervention. Additionally, these results were evident despite using a last-observation carry-forward approach to children who did not complete the MFC, which assumed no improvement from children who failed to complete the group treatment. Results suggested that the length, structure, and format of the treatment were acceptable for families of children with ADHD, as 85% of children who initiated the MFC group treatment were able to complete the treatment. Overall, results provided initial support for the MFC as an intervention for the emotion regulation difficulties of children with ADHD. These results are particularly notable given that no well-established treatment currently exists that focus explicitly on deficient emotion regulation among children with ADHD.

Clinical Implications

Numerous studies have demonstrated the deleterious impact of emotion dysregulation on children with ADHD (see Shaw et al., 2014, for a review), with many suggesting that it is the interaction of emotion dysregulation with ADHD-related impulsivity that creates risk for the significant emotional and behavioral difficulties experienced by many children with ADHD (Anastopoulos et al., 2011; Graziano, McNamara, Geffken, & Reid, 2013; Rosen et al., 2015). However, few (if any) interventions have been developed that directly address the complex and multisystemic emotion regulation difficulties common to children with ADHD. The current study used a multimodal and multisystemic intervention that integrated well-validated physiological (i.e., Porges, 2001), cognitive (i.e., Gross, 2002; Gross & John, 2003), temperamental (i.e., Karalunas et al., 2014; Rothbart & Sheese, 2007), and socioemotional (i.e., Zeman et al., 2006) models of emotion regulation to directly teach children with ADHD to recognize, reattribute, and regulate emotional reactivity and distress. This open trial of the MFC suggests that psychosocial interventions focused specifically on deficient emotion regulation can lead to substantive improvements in emotion regulation and emotional and behavioral functioning among children with ADHD.

The current open trial is a significant step forward in addressing the damaging impact of deficient emotion regulation on children with ADHD. Interventions for ADHD typically focus primarily on the core neurocognitive symptoms and/or secondary behavioral difficulties of ADHD (Watson, Richels, Michalek, & Raymer, 2015). Indeed, Watson and colleagues (2015) note that “although psychosocial treatments (for ADHD) are varied in scope, all tend to focus on modifying disruptive or distracting behaviors” (p. 4). Polypharmacy is often used to address the emotional and behavioral difficulties of children with ADHD given the high rates of emotion regulation difficulties and comorbid emotional and behavioral disorders (Joseph et al., 2016) despite limited evidence for the efficacy of polypharmacy for children with ADHD (Bussing & Winterstein, 2012). Indeed, nearly half of the children in this study were receiving polypharmacy prior to the initiation of the intervention. Similarly, while there is some evidence that behavioral treatments for ADHD have efficacy at improving the functioning of children with ADHD in the presence of comorbid disorders (Pelham & Fabiano, 2008), the primary focus of behavioral treatments for ADHD is on reducing disruptive and defiant behavior rather than improving deficient emotion regulation. The intervention developed for the current study thus has the potential to substantially improve our abilities to directly treat the

emotion regulation difficulties that are so common among and impairing to children with ADHD.

Theoretical Implications

The current study employed an inclusive and integrative model of emotion regulation to develop a multisystemic treatment methodology that addressed physiological, social cognitive, temperamental, and behavioral elements of emotion regulation among children with ADHD. Specifically, the treatment included components to address maladaptive physiological reactivity (i.e., Porges, 2001), cognitive misattribution (Gross & John, 2003), use of “hot” (i.e., emotion-driven) rather than “cold” (i.e., measured) cognitive systems in response to stress (Kim, Nordling, Yoon, Boldt, & Kochanska, 2013), irritability and negative affectivity (Rothbart & Sheese, 2007), and tendency towards rash action when distressed (i.e., negative urgency; Marmorstein, 2013), which are all commonly seen in children with ADHD with deficient emotion regulation. Specifically, the treatment used a theoretical model that integrated “bottom-up” and “top-down” models of emotion dysregulation to address the comprehensive emotion regulation difficulties common to children with ADHD (Shaw et al., 2014). Overall, the current study offered support for a multisystemic and multidimensional-based intervention for deficient emotion regulation among children.

Limitations

While the current study offers initial support for use of a multisystemic intervention for the emotion regulation difficulties of children with ADHD, there are several limitations that need to be acknowledged. The current study is an initial open trial of the MFC using consecutive referrals to a clinical intervention in an academic medical center-based ADHD clinic. As such, the study does not include either randomization to treatment or a control group. While this design is appropriate for initial testing of a novel treatment approach, it does preclude the study from exclusively attributing change to the active components of the treatment. Indeed, it is likely that some of the demonstrated pre-post changes in parent and child-ratings of emotional and behavioral improvement were due to common factors (e.g., expectancy of change, maturation, regression to the mean, etc.) rather than specific components of the treatment. However, it is notable that the results of the study demonstrated significant reduction of difficulties directly targeted by the treatment (i.e., emotional reactivity, internalizing and externalizing problems, child self-perceptions of negative mood) but not of difficulties that appear similar in nature but were not directly targeted by the treatment (i.e., child self-perceptions of worry and anxiety). Additionally, a

study with a similar age range demonstrated minimal changes in emotion regulation over a 6-month period (Rosen et al., 2012), suggesting that emotion regulation can be expected to be stable without intervention. Similarly, while the results of this study indicated impressive change from the pretreatment to posttreatment periods, this study was not able to determine if these gains in functioning were maintained over time. However, it is notable that a follow-up analysis of a small sample of participants in the current study demonstrated not just maintenance of gains but continued improvement in emotional and behavioral functioning over a 12-month period (Rosen et al., 2014).

An additional limitation concerns the format and delivery of the MFC. The MFC was designed as a group intervention given that the emotion regulation difficulties of children with ADHD often manifest in social settings (Maedgen & Carlson, 2000). Group administration also allows for efficient intervention of a larger number of children, which is important given the frequency of ADHD and emotion regulation difficulties in clinical settings (Shaw et al., 2014). However, group administration does not allow for tailoring the treatment to address individual emotion regulation difficulties. Thus, future research is needed to develop individual adaptations of the MFC. Similarly, the MFC was developed using a multisystemic and multidimensional model of emotion regulation, and thus contains multiple treatment components. Further component and dismantling studies are needed to determine if all the modules represent active treatment components.

This study was conducted as an open trial of the MFC in a clinical setting, and concerns were taken to maximize external validity by conforming to common clinical procedures. However, while the use of clinical intake procedures allows the results to more easily generalize to clinical settings, they do represent a limitation in the reliability of the diagnoses of participants in the present study. Additionally, given that the open trial was conducted as a clinical service within an academic medical center, it could not be determined how many children declined to be screened or were not eligible to participate. While this is consistent with the RECORD guidelines, it represents a limitation in determining the generalizability of this study to a community population. Similarly, medication status was free to vary among children enrolled in the open trial. However, given that the MFC was designed as an adjunctive treatment of emotion regulation difficulties in children with ADHD rather than as a primary treatment of the core ADHD symptoms of inattention, hyperactivity and impulsivity, allowing medication status to vary was appropriate for ecological validity. Finally, while the treatment was well-tolerated as evidenced by the 85% retention rate across

treatment, the reasons for premature treatment termination could not be ascertained. Future studies are needed to determine how to reduce dropout rates.

Conclusion

Deficient emotion regulation is among the most robust and impairing complications of ADHD in children, yet minimal options currently exist for helping children like Dylan. The current study represents an open trial of the Managing Frustration for Children with ADHD group intervention, one of the first interventions specifically developed for treating the emotion regulation difficulties that are common to children with ADHD. This study is among the first to demonstrate improvement in the emotion regulation of children with ADHD following completion of a psychosocial intervention. Although further study is needed, this intervention has the potential to significantly improve the lives of children with ADHD like Dylan by reducing the significant impact of emotion regulation difficulties on the emotional, behavioral, and social functioning of children with ADHD. Our hope is that development and initial evaluation of the Managing Frustration for Children group intervention for ADHD can present a first step in filling the gap in the extant clinical literature and allow for effective and clinically meaningful improvement in the functioning of children with ADHD.

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- Address correspondence to Paul J. Rosen, Ph.D., University of Louisville, Department of Psychological and Brain Sciences, 353 Life Sciences, Louisville, KY, 40292; e-mail: Paul.Rosen@louisville.edu.
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