Childhood Maltreatment, Emotional Dysregulation, and Psychiatric Comorbidities

Yael Dvir, MD, Julian D. Ford, PhD, Michael Hill, BS, and Jean A. Frazier, MD

Abstract: Affect dysregulation, defined as the impaired ability to regulate or tolerate negative emotional states, has been associated with interpersonal trauma and posttraumatic stress. Affect-regulation difficulties play a role in many psychiatric conditions, including anxiety and mood disorders, and especially major depression in youth and bipolar disorder throughout the life span. Exposure to traumatic events and interpersonal trauma in childhood is associated with wide-ranging psychosocial, developmental, and medical impairments in children, adolescents, and adults, with emotional dysregulation being a core feature that may help to account for this heightened risk. In order to understand how the developmental effects of childhood maltreatment contribute to emotional dysregulation and psychiatric sequelae, we review emotional regulation and its developmental neurobiology, and examine the research evidence of associations between childhood trauma, emotional dysregulation, and psychiatric comorbidities in children, adolescents, and adults.

Keywords: childhood maltreatment, comorbidity, emotional regulation/dysregulation, interpersonal trauma, posttraumatic stress, posttraumatic stress disorder

Multiple interdependent processes are involved in emotions and their regulation, spanning the biological, psychological, and interpersonal domains.[1] A fundamental interplay exists between emotional and cognitive operations, which include selecting and modifying situations that have emotional significance, deploying attention, integrating information, making judgments and decisions, and selecting behavioral responses. While some emotions are generated automatically, others are elicited and fully apprehended only after considerable "meaning analysis." In the same way, emotional regulation may be automatic or, instead, controlled with effortful cognitive processing.[2,3] Emotion involves the coordination of physiological reactions, memory, cognitive appraisals, and behavior. Emotional regulation can be defined as having control not only over how and when, but also the intensity and positive/negative valence with which, emotions are felt,

experienced, and expressed. Emotions and their regulation occur continuously over time and may include changes in all three domains (behavior, experience, and physiology).[3]

Humans have the capacity to increase, maintain, or decrease negative and positive emotions in both conscious and unconscious ways that can facilitate or impede the attainment of behavioral goals.[3–5] We can modify our responses to emotions by planning ahead to select or modify emotionally laden situations or by focusing on the response once an emotion has been experienced. Attentional deployment can determine what aspect of a situation is being focused on, and may result in distraction (which can decrease awareness and intensity of negative emotions) or in rumination (which may increase their salience, persistence, and intensity). Changing a thought that is associated with a situation can determine the attached meaning. Although this technique is often used to decrease emotional intensity, it can also magnify a response or alter the emotion altogether. Both emotional states and goal-directed behavior can be modulated by decreasing negative, or increasing positive, expressive behavior, or by addressing physiological responses—through the use of, for example, cognitive-behavioral therapy or medications that decrease negative affective states such as anxiety and depression.[3] Other features of emotional regulation are emotional awareness, the capacity to recognize and distinguish emotions experienced by oneself and others, and social cognition, the ability to process social emotions, including empathy, moral reasoning, theory of mind, and emotional comprehension.

Both emotional awareness and social cognition appear to be key elements in the ability to regulate emotions, and are impaired in a number of psychiatric conditions.[6]

NEUROBIOLOGY OF EMOTION AND ITS REGULATION

The generation of emotion occurs as an interaction of bottom-up (brain stem and limbic system to higher cortical regions) and top-down (prefrontal cortex to midbrain and brain stem areas via the amygdala) series of actions.[5–10] Neuroimaging data suggest that responses to emotional tasks are widely distributed throughout the brain, that higher cortical areas are not limited to emotional regulation, and that limbic regions are not restricted to emotional activation. Emotional regulation involves a widely distributed functional network with bidirectional associations among many emotion-relevant brain regions.[5,11,12] In a meta-analysis of 162 neuroimaging studies of emotion, Kober and colleagues[11] identified regions within the medial, orbital, and inferior lateral frontal cortices as brain regions that were activated consistently during administration of emotional tasks. The amygdala, ventral striatum, thalamus, hypothalamus, and periaqueductal gray (brain regions that have been found to be important in emotion in animals) were identified as areas with multiple activations. The maturation of neural and neuroendocrine arousal systems associated with emotion throughout childhood and adolescence can explain the decrease in emotional lability and increase in self-control that occurs over this early period of development. These processes include maturation of parasympathetic regulation in early childhood and the developmental changes in the hypothalamic-pituitary-adrenocortical axis. Maturation of these systems is shaped by early experiences and caregiver responsiveness. Developmental influences promoting enhanced emotional regulation for children as they grow older include the acquisition of language as a means to understand and communicate emotions, and maturation of other cognitive functions, including the attentional system.[7]

These brain systems are shaped by early experiences and reflect developmental history. It is possible that early-life adversity changes the threshold of limbic reactivity or changes perceptual and cognitive appraisals related to threat.[7,13] For example, children growing up in early adversity are more likely to be emotionally reactive to stress and also less capable of emotional regulation.[14] Brain-imaging studies in those who experienced childhood maltreatment point to frontolimbic circuits as the most affected brain regions.[15] Consistent with this view, two different forms of emotional dysregulation with distinct patterns of cortical and subcortical activation and symptom profiles in post-traumatic stress disorder (PTSD) have been identified.[16,17] Undermodulated emotion (e.g., anxiety, hyperarousal, dysphoria) is related to the classic pattern of heightened amygdala activation and reduced prefrontal inhibitory activation. Overmodulated emotion (e.g., dissociation, emotional numbing), by contrast, is related to extensive midline prefrontal inhibition of limbic activity.[17] Support for a dissociative subtype of PTSD consistent with overmodulation has been reported in a recent World Health Organization World Mental Health Survey[18] and in recent clinical and neurobiological research.[19]

Recent neuroimaging research has identified a different set of patterns of brain activity than the fear/stress circuits—which may be involved in emotional regulation and dysregulation in PTSD and other psychiatric disorders. This *default mode network* involves activation of the medial temporal and prefrontal cortices and also limbic areas (e.g., hippocampus) that are integrated in the posterior cingulate.[20,21] The default mode pattern of brain activation occurs when attention is focused away from the external environment and goal-directed behavior and toward self-referential thought.[21] Reduced levels of default mode activation have been found in individuals with borderline personality disorder who are experiencing pain[22] and in persons with PTSD when at rest,[20] and are also a predictor of risk of developing PTSD in acutely traumatized individuals.[23] Deficits in default mode network connectivity have been hypothesized to be associated with sequelae of exposure to childhood adversity, including emotional dysregulation and deficits in attentional shifting, mindfulness, and self-referential encoding.[20,22] As such, default mode processing potentially represents a brain substrate of emotional dysregulation that is distinct from the classic fear-conditioning pathway in anxiety disorders.[24]

EMOTIONAL REGULATION AND ASSOCIATED PSYCHIATRIC MORBIDITY

Problems with emotional regulation play a role in the development, maintenance, and treatment of many psychiatric conditions. Maladaptive coping with challenging emotions is common in depression, bipolar disorder, borderline personality disorder, substance use disorders, eating disorders, and somatoform disorders, among others.[25] In children, some forms of externalizing problems have been linked with emotional dysregulation.[2] In addition, reactive aggression, which is driven by negative emotional states, is associated with higher cortisol reactivity[26] and decreased emotional regulation. Maltreated children are at higher risk for both reactive aggression and deficits in emotional regulation.[27,28] More generally, executive dysfunction and emotional control (including effortful, cognitively mediated control) appear to be inversely related,[2] and internalizing problems such as anxiety, depression, withdrawal, and somatic complaints are conceptually related to other forms of emotional dysregulation that involve difficulty in controlling attention and cognition. For example, rumination and attention bias toward negative stimuli is associated with internalizing disorders.[2]

From a developmental perspective, an important question is whether emotional dysregulation is a risk factor

for, or a consequence of, psychopathology. McLaughlin and colleagues[29] investigated this question by prospectively assessing depression, anxiety, aggressive behavior, disordered eating, and emotional regulation (measures of emotional understanding and expression, and rumination in reaction to distress) in 1065 adolescents. They found that emotional dysregulation contributed to multiple and varied psychiatric and psychosocial impairments in adolescence (anxiety, aggression, and disordered eating) but that emotional dysregulation was not primarily a consequence of psychopathology; such pathology did not predict changes in emotional regulation over time.

Childhood dysregulation may have detrimental effects across the life span by increasing the risk of emotional dysregulation in adulthood. For example, a 14-year prospective, follow-up study of 2076 Dutch children found that those with severe challenges regarding emotional regulation (attention problems, aggressive behavior, and anxious-depression as rated on the Child Behavior Checklist) were at increased risk for problems with regulating affect, behavior, and cognition in early adulthood.[30] Retrospective studies have shown that problems with emotional regulation in childhood secondary to exposure to complex trauma are associated with dysregulation in multiple domains of informational processing (physiological, sensory, emotional, and cognitive) and self- and relational dysregulation throughout adulthood.[13]

CHILDHOOD TRAUMATIZATION AND PSYCHIATRIC COMORBIDITIES IN CHILDREN AND ADULTS

The consequences of exposure to interpersonal trauma vary from individual to individual and also, over time, for the same individual. Many traumatized children do not develop PTSD or any other disorder. Nevertheless, individuals who experience interpersonal trauma in childhood are at increased risk for numerous psychiatric disorders, including attachment disorders,[13] PTSD, depression, and anxiety disorders,[31] oppositional and conduct disorders,[32,33] eating disorders,[34] substance abuse,[35,36] a dissociative variant of PTSD,[17] and personality disorders.[1] Traumatized children also are at risk for self-harm, sexualized behavior, anger, poor impulse control, and attention difficulties.[1] Revictimization is common in maltreated children and adolescents, and is associated with increased risk for PTSD and other comorbidities, such as depressive and substance use disorders.[37]

Various terms have been used to describe children who have experienced early, recurrent, and severe interpersonal trauma—including *developmental trauma disorder*,[38] *complex trauma*,[39] and *polyvictimization*.[40] Those children often present with extreme dysregulation in the physical, affective, behavioral, cognitive, and interpersonal domains. Currently, the category of developmental trauma disorder is being evaluated for clinical utility, and a national field trial is under way. In addition, the fifth edition of the *Diagnostic and Statistic Manual of Mental Disorders* (DSM-5)

has incorporated a number of changes aimed at increasing the developmental sensitivity of PTSD diagnoses in children and adolescents. In preschool-aged children, these changes include a broader range of acute emotional reactions (diminished interest may manifest as restricted play, and detachment may manifest as social withdrawal) and a reduced threshold for internalized experiences that young children may not have the language to describe. In school-aged children and adolescents, trauma may now include loss (including placement in foster care) and the injury or death of a parent. In addition, for all ages, PTSD symptoms have been broadened to include dysregulation in the bodily, affective (including a range of emotions beyond anxiety), cognitive, behavioral, relational, and self/identity domains.[41,42]

Table 1 summarizes some pertinent studies. Findings of two cross-sectional studies suggest an association between childhood maltreatment/other forms of childhood trauma and subsequent psychiatric morbidity. Psychiatric assessment of children removed from their parents' care due to severe maltreatment revealed that more than one in three (35%) met criteria for PTSD and that those children were also at risk for attention-deficit/hyperactivity disorder (ADHD), other anxiety disorders, brief psychotic disorder or psychotic disorder not otherwise specified, and suicidal ideation.[43] Assessment of trauma history and PTSD symptoms in youth presenting with oppositional-defiant disorder (ODD), ADHD, or adjustment disorder suggested that those with externalizing disorders (both ODD and ADHD) were more likely to have experienced maltreatment and that they had more PTSD symptoms, even after controlling for overlapping ODD and PTSD criterion D symptoms (hyperarousal/hypervigilance).[44]

Two large prospective, longitudinal studies also suggested associations between maltreatment in early childhood and the development of PTSD and other psychiatric and behavioral disorders later in adolescence. In a community sample of youth followed from kindergarten through grade 11,[5] adolescents identified at baseline as having experienced physical abuse had significant social and psychiatric difficulties at follow-up.[45] Even when risk factors associated with maltreatment (socioeconomic status, single-parent family, family stress, maternal social support, and the child's temperament and prenatal/postnatal health) were taken into consideration, maltreated adolescents were significantly more likely to be absent from school, were less likely to expect higher education, and experienced more social difficulties and social withdrawal. They also suffered from more anxiety, depression, PTSD, dissociation, and thought problems. The Great Smoky Mountains Study, a longitudinal study of psychopathology and use of medical services in childhood, assessed children from age 9 through 16 for traumatic events, posttraumatic stress (PTS) symptoms, and DSM-IV disorders. Although traumatic events were common and had been experienced by over two-thirds of the children by age 16, only a minority of these children (13.4%)

Table 1			
Studies Describing Exposure to Traumatic Stressors or Maltreatment, with Psychiatric Comorbidities in Children and Adults			
Study	Subjects	Diagnostic instruments	Findings
Trauma exposure in childhood			
Famularo et al. (1996)[43]	n = 117 Age: 6–12 years Maltreated children presenting to juvenile/family court	Diagnostic Interview for Children and Adolescents, Revised Version	35% PTSD Those with PTSD had increased risk for ADHD, anxiety disorders, psychotic symptom, suicidal ideation
Ford et al. (2000)[44]	n = 165 Age: 6–17 years ADHD, oppositional defiant disorder, adjustment disorder	CBCL PTSD Checklist Traumatic Events Screening Inventory	Children with oppositional defiant disorder suffered more physical abuse & sexual abuse, & had increased PTSD symptom severity Rates of physical & sexual abuse and symptom severity as measured by CBCL: oppositional defiant disorder + ADHD > oppositional defiant disorder > ADHD > adjustment disorder
Lansford et al. (2002)[45]	n = 585 youth 79% participated from kindergarten through 11th grade	Parent interview at kindergarten School records at 11th grade CBCL at 11th grade Adolescent Behavior Questionnaire	n = 69 (11.8%) had suffered physical abuse prior to kindergarten; had increased school absence, social difficulties, social withdrawal, anxiety, depression, PTSD, dissociation, thought problems; had decreased expectations of a higher education
Copeland et al. (2007)[46]	n = 1420 Age: 9, 11, & 13 years at intake Followed annually until age 16	CBCL Child and Adolescent Psychiatric Assessment	By age 16, 37% had exposure to multiple traumatic events; of those,13.4% had posttraumatic stress symptoms; 0.5% (of entire sample) had PTSD Trauma had increased anxiety & depression, & had doubled other psychiatric disorders (all diagnostic groups except for substance abuse)
Trauma exposure in early childhood			
Mongillo et al. (2006)[47]	n = 917 Age: 18–36 months	The Infant-Toddler Social & Emotional Assessment CBCL	From 6–36 months, 23.4% experienced at least one adverse/potentially traumatic event Trauma had led to increased symptom severity, internalizing & externalizing; 20% PTSD
Briggs-Gowan et al. (2010)[48]	n = 213 Age: 2–4 years	Preschool Age Psychiatric Assessment Child Life Events Scale	Exposure to domestic violence had resulted in increased internalizing (depression, separation anxiety, posttraumatic stress) & externalizing (conduct problems)
Briggs-Gowan et al. (2012)[49]	n = 437 Age: 1 year Followed annually until age 3	Child Life Events Scale The Infant-Toddler Social & Emotional Assessment CBCL Adaptive Social Behavior Ratings Scale	Exposure to domestic violence & neighborhood violence before the age of 3 years had resulted in increased posttraumatic stress symptoms & externalizing, & more social difficulties

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Table 1			
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Study	Subjects	Diagnostic instruments	Findings
Adverse childhood experiences			
Chapman et al. (2004)[50]	n = 2946 adults	Adverse Childhood Experience Study Questionnaires Screening instrument for depressive disorders developed for the Medical Outcomes Study Psychiatric Screening Questionnaires for Primary Care Patients	Increased adverse childhood experiences increased the risk of lifetime & current depressive disorders
Lu et al. (2008)[51]	n = 254 adults	SCID Sexual Abuse Exposure Questionnaire PTSD Checklist Dartmouth Assessment of Lifestyle Instrument Revised Conflict Tactics Scales	Increased adverse childhood experiences associated with high-risk behaviors, substance abuse, revictimization, PTSD & increased psychiatric illness severity at a younger age
Adult sequelae of childhood trauma exposure			
Yen et al. (2002)[52]	Adults Collaborative Longitudinal Personality Disorder Study (subgroup)	Diagnostic Interview for DSM-IV Personality Disorders SCID SCID Trauma Addendum	Adults with borderline personality disorder had more trauma, childhood sexual abuse/trauma & PTSD; first exposure to trauma was at a younger age
Golier et al. (2003)[53]	n = 180 outpatients with personality disorder	Trauma History Questionnaire SCID, PTSD Module	Outpatient adults with borderline personality disorder had more childhood/adulthood physical abuse & current PTSD Trauma had stronger association with paranoid personality disorder
Van Dijke et al. (2012)[54]	n = 472 psychiatric inpatients	Composite International Diagnostic Interview Borderline Personality Disorder Severity Index Bermond-Vorst Alexithymia Questionnaire	Childhood trauma inflicted by a primary caregiver increased emotional dysregulation in inpatients with borderline personality disorder
ADHD, attention-deficit/hyperactivity disorder; CBCL, Child Behavior Check List; PTSD, posttraumatic stress disorder; SCID, Structured Clinical Interview for DSM.			

had developed PTS symptoms, and less that 0.5% of the children had developed PTSD. PTS symptoms were most likely to develop in those with prior and multiple traumatic exposures, preexisting anxiety disorders, and family adversity, and especially in those who experienced violent or sexual traumas. PTS symptoms were rare and brief in those who experienced a first traumatic event and were not predicted by parental psychopathology. It is interesting to note that trauma exposure was strongly associated with anxiety and depression, and nearly doubled the rates of other psychiatric disorders (all diagnostic groups excluding substance abuse). This association was most pronounced in children who experienced PTS symptoms.[46]

The adverse impact of trauma exposure on risk of psychiatric morbidity may begin early in childhood. Almost a quarter (23.4%) of prospectively followed toddlers had already experienced a potentially traumatic event; those exposed were more likely to exhibit internalizing and externalizing behaviors and had more severe symptoms; and approximately 20% of those exposed had PTSD.[47] A cross-sectional examination of these associations in preschool children suggested that after controlling for

socioeconomic factors, exposure to domestic violence was associated with internalizing (depression, separation anxiety, PTS) and externalizing (conduct problems) disorders. Parental mood and anxiety symptoms partially or fully accounted for these associations, suggesting a potential intergenerational effect of dysregulation in children's posttraumatic psychopathology.[48] Another prospective study following children from the age of three to school-aged found that exposure to domestic and neighborhood violence at or before the age of three was correlated with PTS, internalizing and externalizing symptom severity, and social difficulties at school age, independent of economic disadvantage and exposure to violence within the past year.[49] Various other studies have shown that adults who experienced early-life trauma continue to be at risk for PTSD, other anxiety[55] and affective[50] disorders, addictions,[56–58] psychotic illnesses,[34,59] personality disorders,[52] dissociative identity disorder,[60] and suicidal behavior[61] as well as for revictimization and multiple medical problems, including diabetes, heart disease, immune disorders, and chronic obstructive pulmonary disease.[1,62–64]

Adults self-reporting childhood adversity, especially emotional abuse, were found to have increased risk of lifetime and current depressive disorders in adulthood, even decades after occurrence of adversity.[50] Adults with severe mood disorders who reported adverse childhood experiences were found to have increased high-risk behaviors, substance abuse, revictimization, and PTSD, and more severe psychiatric illness that presented at a younger age.[51]

Although all psychiatric disorders are likely to involve dysregulation, perhaps the clearest example of psychopathology involving emotional dysregulation is bipolar disorder. Over the last decade, childhood bipolar disorder has been a controversial topic debated in the research and clinical communities; it is now largely agreed, however, that some youth do meet full DSM criteria for bipolar disorder and that this phenotype does exist. While it is possible that this debate has affected the rate of bipolar disorder diagnosed in persons with trauma exposure, the available evidence suggests that childhood trauma histories are frequent and that they affect the clinical presentation of bipolar disorder. Childhood exposure to interpersonal trauma is reported in about half of adult patients with bipolar disorder, across several studies. Adults with bipolar disorder and a history of childhood trauma have more frequent prepubertal onset of affective symptoms, significantly younger age at bipolar illness onset, and more severe symptoms.[65–69] In a recent publication, Connor and Doerfler[70] identified higher rates of comorbid PTSD in a small single-site clinical sample of youth with bipolar disorder, diagnosed using standardized assessments and DSM-IV-TR criteria (n = 27), compared to youth with disruptive behavioral disorders and negative mood (n = 96). Emerging evidence suggests that both polyvictimization and the presence of comorbid bipolar disorder in adolescents lead to PTSD presentations that are less responsive to treatment and less likely to remit.[71] To date,

however, no study has systematically evaluated the association between childhood exposure to interpersonal trauma and early-onset bipolar disorder.

Emotional dysregulation is also prominent in personality disorders. The association between exposure to interpersonal trauma and personality disorders is one that has received, and continues to receive, substantial attention. Individuals with severe, disabling personality disorders (borderline, schizotypal, and paranoid) self-report more types of interpersonal trauma and childhood physical abuse than those with other personality disorders.[52,53] More specifically, adults with borderline personality disorder and paranoid personality disorder have the highest rates of exposure to trauma (especially childhood sexual trauma), high rates of PTSD, and younger age at first exposure to trauma.[52,53] There is also an association between childhood trauma by primary caregiver and emotional dysregulation in adults with borderline personality disorder.[72–74]

Further, two forms of emotional dysregulation were identified in an adult psychiatric inpatient sample, consistent with the distinction described by Lanius and colleagues[17] of emotional *undermodulation* and *overmodulation*— although the sample also suggested a more nuanced view of the role of dissociation in emotional dysregulation. Patients diagnosed with borderline personality disorder were primarily characterized by undermodulation of emotion, positive psychoform dissociation symptoms (such as flashbacks), and complex PTSD symptoms. By contrast, those diagnosed with somatoform disorders tended to present with overmodulated emotional responding and negative psychoform dissociation symptoms (such as amnesia).[72–74] In addition, specific difficulties with different affect capacities were found to be associated with borderline personality disorder, somatoform disorders, and other psychiatric disorders, suggesting that patterns of emotional dysregulation can be identified in relation to specific types of psychopathology.[54]

Studies have consistently found a correction between the severity of personality disorder (including but not limited to borderline personality disorder) and the severity and developmental impact of trauma exposure, as evident by younger age at first exposure to maltreatment, more assaultive and personal trauma, and more types of traumatic events.[52,53]

To summarize, maltreated children are at increased risk for internalizing disorders (including PTS symptoms and PTSD), externalizing disorders, and psychosocial impairment at initial presentation and also when longitudinally followed or retrospectively assessed in adolescence and adulthood. Not all trauma exposure results in PTS or PTSD, but it does appear to increase risk of a variety of other disorders. In adults, the potential sequelae of exposure to adversity in childhood involve a heightened risk and severity of affective disorders (including but not limited to bipolar disorder) and also of other forms of severe psychopathology, including personality disorders.

CHILDHOOD MALTREATMENT AND EMOTIONAL DYSREGULATION

Emotional regulation can be viewed as a developmental task that is highly influenced by the ability to develop appropriate secure attachments. Emotional regulation appears to develop in the context of responsive caregiving and peer involvement in early life.[1] Not only do caregivers provide for their children's basic survival needs, but interactions with caregivers are necessary for the development of bodily self-regulation.[1] In humans, childhood maltreatment, especially repeated trauma, disrupts the acquisition of appropriate emotional-regulation and interpersonal skills.[64,75] This disruption of skill acquisition may occur as a result of psychological experiences but is also a sign of the neurobiological effects of maltreatment.[75,76] These effects include molecular alterations to stress hormone response systems, which, in turn, affect myelination, neuronal morphology, neurogenesis, and synaptogenesis in different brain regions, resulting in functional changes in left hemisphere development, decreased right/left hemisphere integration, increased limbic electrical irritability, and diminished functional activity in the cerebellar vermis.[70,76]

A number of studies have empirically examined the associations between emotional dysregulation and a history of traumatic exposure in youth, and have highlighted the importance of early caregiver responsiveness and how deficits in responsiveness may compromise the development of interpersonal communication and interpretation of social cues. Key study findings are further described in Table 2, and summarized below. In two studies, Shipman and colleagues[77,80] attempted to identify which processes in emotional development differ in maltreated and non-maltreated children. They found that girls who experienced sexual abuse were less able to understand and regulate emotions. They also expected to receive less emotional support and to encounter more interpersonal conflict in response to expression of negative emotional states—in particular, when expressing sadness to parents or anger to peers.[77] When compared to healthy controls, children (boys and girls) who experienced neglect had lesser ability to understand negative emotions such as anger and sadness, and fewer adaptive emotional-regulation skills. Furthermore, these children expected their mothers to respond negatively to expression of anger and sadness, and possibly as a result, they attempted to hold back their display of such emotions.[80] Both studies suggest that maltreated children, whether they experience sexual trauma or neglect, show deficits or delays in understanding and regulating emotions, and that they anticipate negative reactions to display of sadness and anger. This point is an important one, as such skills can be taught as part of clinical interventions aimed at treating victimized children.[87,88]

The development of secure attachment with caregivers early in childhood has been theorized to be essential to the development of emotional regulation.[89] Disruption of the formation of secure internal representations (described by Bowlby as "working models")[90] by interpersonal trauma such as maltreatment may therefore substantially compromise the acquisition of emotional-regulation capacities in childhood. Shields and colleagues[78] examined whether maltreated children had difficulties in forming secure caregiver representations and regulating emotion, and whether such difficulties were associated with problems in social adjustment. They found that children who experienced maltreatment had disorganized, vague, and negatively toned internal representations of caregivers and had problems with emotional dysregulation, aggression, and decreased social competence (peer rejection).

Pollak and colleagues[91] examined the development of emotion recognition in maltreated children. Their studies identify a number of differences in mechanisms linking early-life exposure to potentially traumatic experiences and emerging emotions. Neglected preschool children had more difficulty discriminating emotional expressions and identifying discrete emotions, whereas physically abused children displayed a response bias for angry facial expressions and showed the most variance across emotions. Physically abused 8–11 year olds had difficulties disengaging attention from angry facial cues.[92] Despite these deficits in emotion recognition, however, physically abused children were better able to accurately recognize early facial expression of anger, when few physiological cues were available, suggesting a readiness to detect subtle behavioral signs of anger.[93]

A few studies found that a history of maltreatment affects children's development of emotional regulation and social adjustment. Maughan and colleagues[79] found that in response to a simulation of angry adult interactions, 80% of maltreated children, compared to 37% of the non-maltreated controls, were observed to have problems with emotional regulation. These problems were associated with maternal reports of child behavior problems and of anxious and depressed symptoms. Kim and colleagues[85] described a bidirectional relationship between emotional dysregulation and social dysfunction in maltreated youth. Emotional dysregulation was associated with a history of neglect, with physical and sexual abuse (separately and in combination), and with earlier age at onset of abuse. Emotional-regulation deficits were also linked to externalizing behaviors, which, in turn, contributed to peer rejection, and vice versa. Not surprisingly, in the same study, emotional-regulation ability was positively correlated with peer acceptance and lower rates of internalizing behaviors.

Rogosch and colleagues[81] conceptualized emotional and behavioral dysregulation—as defined by affective negativity, irritability, lability, suicidal/self-harm behavior, and impulsivity and extreme conflict and struggle in interpersonal relationships with peers and adults—as potential precursors to borderline personality disorder in children, and found consistent evidence of a relationship between history of maltreatment and all of the indices of dysregulation.

Table 2			
Studies Describing Childhood Maltreatment and Emotional Dysregulation			
Study	Subjects	Measures of emotional dysregulation	Findings
Shields et al. (1998)[28]	Maltreated children: n = 141 Healthy controls: n = 87 Age: 6–12 years	CBCL Teacher Report Form Emotion Regulation Checklist	Maltreated children had increased aggression & decreased attention, emotional regulation & socially appropriate expression of emotions Physically abused children showed increased reactive aggression
Shipman et al. (2000)[77]	Sexual abuse: n = 21 girls Healthy controls	Emotional understanding interview Children's Emotion Management Scales (Anger & Sadness) Emotion Regulation Checklist Emotion Management Interview	Sexually abused girls had decreased emotional regulation & understanding, & expected to receive less emotional support and to encounter more interpersonal conflict in response to expression of negative emotional states (sadness to parents, anger to peers)
Shields et al. (2001)[78]	Maltreated children: n = 76 Healthy controls: n = 45 Age: 8–12 years	Rochester Parenting Stories	Maltreated children had increased emotional dysregulation & aggression, & decreased social competence
Maughan et al. (2002)[79]	Maltreated children: n = 88 Healthy controls: n = 51 Age: 4–6 years	Person-oriented emotional-regulation patterns in response to simulated inter-adult anger CBCL	Maltreated children had increased emotional dysregulation
Shipman et al. (2005)[80]	Maltreated children: n = 24 Healthy controls: n = 24 Age: 6–12 years	Questionnaires + interview-assessed emotional understanding & regulation	Maltreated children had decreased understanding of negative emotions (anger & sadness) & decreased emotional-regulation skills
Rogosch et al. (2005)[81]	Maltreated children: n = 185 Healthy controls: n = 175 School-aged	Maltreatment Classification System Attention Network Test for children Perceptions of Peers and Self Relationship Stance Questionnaire Children's Depression Inventory Teacher's report form Emotion Regulation Checklist Student-Teacher Relationship Scale Peer sociometric ratings	Maltreated children had higher mean levels of borderline personality disorder precursors, & children with high precursor levels were more likely to have been maltreated

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Study	Subjects	Measures of emotional dysregulation	Findings
Cloitre et al. (2005)[82]	n = 164 women	Childhood Maltreatment Interview Schedule Sexual Assault and Additional Interpersonal Violence Schedule Social Adjustment Scale–Self-Report Modified PTSD Symptoms Scale General Expectancy for Negative Mood Regulation Scale Inventory of Interpersonal Problems	Increased PTSD symptoms predicted greater functional impairment Decreased emotional regulation & interpersonal problems together: equal to PTSD symptoms in impact on psychosocial functioning
Tull et al. (2007)[83]	n = 108 college students with history of trauma	Trauma Events Questionnaire PTSD Checklist Difficulties in Emotion Regulation Scale Positive and Negative Affect Schedule	Students with posttraumatic stress symptoms had increased emotional dysregulation Students with PTSD had much greater emotional dysregulation
Burns et al. (2010)[64]	n = 912 female college students	Childhood Trauma Questionnaire Difficulties in Emotion Regulation Scale Trauma Symptom Inventory	Increased reports of sexual, physical, or emotional abuse were linked to increased emotional dysregulation & posttraumatic stress symptoms
Messman-Moore et al. (2010)[84]	n = 752 female college students	Computer Assisted Maltreatment Inventory Difficulties in Emotion Regulation Scale Cognitive Appraisal of Risky Events–Revised Sexual Experiences Survey	Childhood physical & sexual abuse increased the risk for adolescent/adult rape Emotional dysregulation was a mediating factor for revictimization Sexually risky behavior was predicted by emotional dysregulation
Kim et al. (2010)[85]	Maltreated children: n = 215 Healthy controls: n = 206 Age: 6–12 years	Maltreatment Classification System Emotion Regulation Checklist Peer nominations Teacher's report form	Increased emotional dysregulation associated with neglect, physical & sexual abuse, multiple types of maltreatment experiences & younger age at onset Externalizing behavior were associated with increased emotional dysregulation & peer rejection (bidirectional)
Bradley et al. (2011)[86]	n = 530 adults	Childhood Trauma Questionnaire Positive and Negative Affect Schedule Emotion Dysregulation Scale Clinician-administered PTSD Scale	Increased childhood trauma was associated with increased negative affect, posttraumatic stress symptoms, drug abuse, depression, suicidality & emotional dysregulation
CBCL, Child Behavior Check List; PTSD, posttraumatic stress disorder.			

Studies examining the associations between trauma history and emotional dysregulation have also been conducted in young adult populations, specifically with college students. These studies describe a consistent correlation between trauma exposure and emotional dysregulation, as well as a correlation between PTS symptom severity and emotional dysregulation.[64,83,84] Tull and colleagues[83] described a correlation between PTS/PTSD and several measures of emotional dysregulation, including difficulty accepting and recognizing emotions, difficulties utilizing strategies to manage and regulate negative emotion when upset, and impulsivity. Burns and colleagues[64] found that emotional abuse was the most powerful predictor of emotional dysregulation, perhaps because it interferes with the acquisition of developmentally appropriate emotional-regulation skills. In Ford and colleagues' sample,[94] more than 50% reported at least one symptom of dysregulation, which was, in turn, associated with risk of PTSD and other anxiety or affective disorders. Dysregulation also was uniquely associated with the severity of interpersonal trauma history, particularly with past abuse or multiple interpersonal traumas. By contrast, non-interpersonal trauma was associated with risk of PTSD and dissociative symptoms, but not with dysregulation.[94] These findings suggest that interventions aimed at improving emotional-regulation strategies may be an important aspect of treatment (and prevention) for young women who have experienced potentially traumatic adversity in childhood.[64,87,88]

Emotional dysregulation can also be understood as the underlying mechanism for risky sexual behavior and sexual revictimization among young adult victims of child sexual and physical abuse. Messman-Moore[84] demonstrated that a history of childhood physical and sexual abuse was associated with both risky sexual behavior and increased risk for being raped as an adolescent or adult; more than a quarter of these women had been sexually revictimized, with emotional dysregulation appearing to be a mediating factor. A higher lifetime number of sexual partners (including strangers) and a higher frequency of risky sexual behaviors were predicted by measures of emotional dysregulation. It also appears that the severity of physical and sexual revictimizations is predicted by childhood sexual abuse.[95] Recent evidence suggests that patterns of exposure to sexual abuse and dysregulation may be intergenerational. Mothers with a history of sexual abuse in their own childhoods were found to be at risk for impairment in their internal attachment representations and in their attachment behavior with their daughters,[96] and their daughters showed impairment in their capacities for emotional regulation[97] and were also at risk for exposure to sexual abuse themselves.[98]

Emotional dysregulation and other impaired self-capacities in adults have been shown to be associated with past exposure in childhood to emotional abuse and a lack of emotional support by parental figures.[99] A large study examined the contribution of emotional dysregulation, childhood trauma, and negative affect to a range of clinical psychopathology, and found that childhood trauma severity, negative affect, and emotional dysregulation all were correlated. Childhood trauma severity also was associated with PTS, drug abuse, depression, and suicidality.[86] In a study of women who were abused in childhood, PTS severity was associated with functional impairment.[82] After controlling for PTSD severity, however, emotional dysregulation and interpersonal problems both were associated with functional impairment and together had an adverse influence on psychosocial functioning equal to that of PTSD symptoms.[82] Thus, emotional regulation, interpersonal problems, and PTSD may be three distinct, but interrelated, adverse sequelae of childhood trauma exposure.

CONCLUSIONS

These studies suggest a complex and bidirectional relationship between childhood trauma exposure and emotional dysregulation. Trauma exposure in childhood is associated with reduced ability to understand and regulate emotions (potentially mediated by relational/attachment difficulties with caregivers and peers) and with heightened levels of internalizing and externalizing psychopathology and impaired social functioning beginning in childhood and continuing into adulthood. Adults with childhood trauma histories are at risk for emotional-regulation problems, PTS, other internalizing-disorder symptoms, functional impairment, and revictimization.

Emotions are generated and regulated in response to situations or thoughts, based on past experience, and can be automatic or controlled. Emotions have a neurobiological substrate and are generated and regulated through bottom-up and top-down processes, involving a complex interplay between cortical and limbic brain regions. Cognitive control and executive function play important roles in these processes, which develop in childhood. Emotional dysregulation has been linked to many forms of psychopathology, including externalizing and internalizing problems in children, and is associated with increased risk across diagnoses. Hence, emotional dysregulation appears to be an important target for therapeutic interventions and focus for children and adults alike.

Substantial evidence connects the experience of childhood exposure to interpersonal traumas, such as maltreatment or family violence, with emotional dysregulation and with multiple related psychiatric sequelae and comorbidities (and not just PTSD). Because childhood exposure to interpersonal trauma is associated with emotional dysregulation across a variety of psychiatric disorders, further clinical and scientific study is needed to determine how best to understand and treat childhood trauma-related emotional dysregulation in a variety of psychiatric disorders, including but not limited to PTSD.

Given that research into emotion generation, recognition, and regulation is expanding to cover wider areas of

neuroscience and psychiatric conditions, standardized assessments of emotional dysregulation, both for evaluation/treatment and research purposes, are critically needed. Specifically, clinical and translational research is needed to assess trauma-related emotional dysregulation and to determine what treatments are effective for different psychiatric disorders. Preventive measures and targeted therapeutic interventions, both psychotherapeutic and pharmacologic, may enhance our abilities to address emotional dysregulation, a problem that impairs the lives of so many who have a history of interpersonal trauma.

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