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Special Issue Article

Emotion dysregulation: A theme in search of definition

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Abstract

Emotion dysregulation is defined as patterns of emotional experience or expression that interfere with goal-directed activity. This paper considers this functionalist definition from a developmental perspective with the goal of elaborating this approach with respect to its central questions. What are the goals that are impeded by emotionally dysregulated responding, and what alternative goals might motivate emotion dysregulation? What are the developmental processes by which these goals take shape, and what are the influences of the family context, and especially of central relationships in the family, in their emergence? How does this functionalist account address the complex interaction of experience and developing biological processes that also influence emotion regulation and dysregulation? Drawing on research literature concerning children at risk for affective psychopathology and considering relevant examples of the interaction of biology and context, this discussion offers a portrayal of emotion dysregulation as a biologically dynamic, experience-based aspect of adaptation to environments and relationships that, in conditions of risk for the emergence of developmental psychopathology, motivates patterns of emotional responding that serve immediate coping often at the cost of long-term maladaptation. Implications for emotions theory and the study of developmental psychopathology are also considered.

Keywords: adaptation, developmental psychopathology, emotion dysregulation, functionalist emotions theory, relationships

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There are several reasons for contemporary interest in emotion dysregulation. One is that emotion dysregulation is a definitional feature of most forms of psychopathology. Consequently, understanding the biological, experiential, and developmental origins of differences in emotion dysregulation is important to understanding and treating clinical disorders. A second reason is that studying emotion dysregulation requires a multilevel approach, which is consistent with the themes of this Special Issue. Advances in behavioral and molecular genetics, stress neurobiology, and behavioral epigenetics are contributing to a better characterization of the biological bases of dysregulatory processes at the same time that researchers are better modeling their interaction with the environment. This multilevel approach is becoming increasingly influential in many areas of psychological research, offering fertile ground for its application to the study of emotion dysregulation.

Third and finally, study of emotion dysregulation complements and extends ideas about emotion regulation, a topic that has been a dominant research interest for more than 20 years. Emotion dysregulation is not simply inadequate emotion regulation, and thus its study raises new questions for students of emotion regulation. For example, if emotion dysregulation derives from a combination of "allostatic and environmental load" in the early years (Buss, Davis, & Kiel, 2011), can this inform how we should think of the biological and environmental interactions supporting the development of emotion regulation? Taken together, these reasons for current interest in emotion dysregulation suggest that this is a particularly exciting time for developing theory and research in this area.

As was true of early work on emotion regulation (Thompson, 1994), however, it is easy for interest in the study of emotion dysregulation to outpace attention to some core conceptual and definitional issues. Like emotion regulation, the idea of emotion dysregulation is so familiar, especially to students of development and psychopathology, that it can be easy to overlook the complexity of this phenomenon. There are many questions that bear thoughtful consideration. How does the functionalist orientation incorporated into most approaches to emotion dysregulation characterize the goals that are undermined by dysfunctional patterns of emotional responding? Why are these dysfunctional patterns maintained in this light, and are there other goals that dysregulated emotional responding helps to achieve? How do these patterns develop, and how can a multilevel approach deepen understanding of the interaction of biological characteristics with environmental supports and challenges? Most broadly, what does the development of emotion dysregulation contribute to understanding emergent psychopathology, and also to understanding emotion and its development?

This paper is devoted to raising some of these core conceptual and definitional questions from a developmental perspective. A developmental approach is important for identifying the origins of individual differences in emotion dysregulation during a period of life when many of the relevant biological and behavioral

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processes are emergent and most plastic, and thus when characteristics of the environment are more influential than at later ages. By contrast with an approach that begins with inquiry about the bases of an adult's affective psychopathology, a developmental approach begins with young children and the relationships that significantly shape early emotional development, for good or for ill, as well as the emotional goals that arise from conditions of early care, and the developmental processes these goals and relationships affect. This approach leads to an understanding of emotion dysregulation as a biologically dynamic, experience-based aspect of adaptation to environments and relationships that, in conditions of risk for the emergence of developmental psychopathology, motivate patterns of emotional responding that serve immediate coping, often at the cost of long-term maladaptation.

This discussion begins with a functionalist analysis of emotion dysregulation and its development, with particular attention to the family conditions that pose risk for the development of affective psychopathology and how young children cope with these conditions. This developmental functionalist analysis especially highlights the nature of early relationships between children and their parents as central to these processes of emotion regulation and dysregulation. Consequently, the next section focuses on these relational influences in the context of some of the biological processes that also contribute to emotion dysregulation. In the last section, conclusions from these research literatures are drawn together into a perspective on the development of emotion dysregulation and its intervention implications.

A Functionalist Approach to Emotion Dysregulation

Cole, Hall, and Hajal (2017) identify four kinds of dysregulated emotion that characterize different forms of psychopathology: (a) emotions endure and regulatory attempts are ineffective (e.g., generalized anxiety and depression); (b) emotions interfere with appropriate behavior (e.g., disruptive behavior disorder); (c) emotions that are expressed or experienced are context inappropriate (e.g., callous-unemotional traits and posttraumatic stress disorder); and/or (d) emotions change either too abruptly or too slowly (e.g., bipolar disorder). One or more of these patterns tend to characterize individuals who are emotionally dysregulated, especially in the context of psychopathology.

To understand why these patterns develop, research has documented the association of affective psychopathology with the use of maladaptive strategies of emotion regulation (such as rumination or suppression) and diminished use of adaptive strategies (such as reappraisal or acceptance; Aldao, Nolen-Hoeksema, & Schweizer, 2010; Schäfer, Naumann, Holmes, Tuschen-Caffier, & Samson, 2017). Maladaptive, deficient, inflexible, or ineffective emotion regulation strategies are an important part of the story of emotion dysregulation. Cole et al.'s (2017) fourfold taxonomy of emotion dysfunction suggests that more is involved, however, including problems in how emotionally evocative situations are appraised, deficient emotional self-monitoring, limited emotional self-efficacy, and other problems. Moreover, emotion dysregulation is evident not only in the dysfunctional valence of responding but also in problematic *emotion dynamics*: persistence, lability, intensity, and rise time can be disturbed in an emotional response whose valence is appropriate for the context. An individual's circumstances may warrant sad affect, for example, but the persistence and intensity of sadness denotes a depressive disorder. Emotion dysregulation is thus a multifaceted phenomenon, and this makes its development a complex process.

Virtually all definitions of emotion dysregulation refer to patterns of emotional experience or expression that interfere with appropriate goal-directed activity (see, e.g., Beauchaine, 2015). This functionalist definition is consistent with the functionalist orientation of emotions theory generally (see Beauchaine & Haines, in press). What are the goals, therefore, that are undermined by emotion dysregulation? In typical circumstances, these goals are readily identified: effective emotion regulation enables children and adults to feel better in difficult situations, mobilize themselves to face challenges, think more clearly, strengthen relationships, and accomplish other purposes. Individuals also regulate themselves to keep emotional responses within socially appropriate and personally manageable limits. More broadly, competent emotion regulation fosters emotional competence, which includes appropriate awareness of one's own emotions, the ability to discern and understand others' emotions, the capacity for empathy, the ability to distinguish subjective emotional experience from external emotional expression, and a capacity for emotional self-efficacy, or to feel as one wants to feel (Saarni, 1999). In typical circumstances, evidence of emotion dysregulation is apparent when these goals are not achieved and emotional responding has the characteristics described by Cole et al. (2017).

The circumstances of children who are at risk for affective psychopathology are not typical, however. For many, beginning early in life, home environments present significant challenges to competent emotion regulation. These challenges undermine achieving the emotion goals described above, in part because they require substituting alternative goals relevant to coping with the home environment. Understanding emotion dysregulation in these contexts requires comprehending the goals that children are motivated to achieve and their implications for immediate and long-term well-being.

Emotion dysregulation in emergent psychopathology

One well-studied example concerns children who have been maltreated. In home environments in which children are at risk of personal harm or deprivation, typical relational support for emotion regulation is lacking, and these relationships instead pose threats that compel the development of alternative strategies for emotion management in the home. In a study of maltreated and nonmaltreated 4- to 6-year-olds, for example, Maughan and Cicchetti (2002) found that maltreatment history was associated with two patterns of emotion dysregulation—undercontrolled/ambivalent and overcontrolled/unresponsive—which mediated associations between maltreatment and anxious and depressed symptomatology. These dysregulated patterns can also undermine children's competence outside the home. In a longitudinal study with maltreated 6- to 12-year-olds, children who were rated as emotionally dysregulated by their camp counselors had higher levels of internalizing and externalizing symptomatology, and this was especially so if abuse began early. A year later, these children suffered greater peer rejection that was associated, in turn, with greater externalizing symptoms (Kim & Cicchetti, 2010). In a study with an independent sample of 7- to 10-year-olds, Kim-Spoon, Cicchetti, and Rogosch (2013) found that early maltreatment was associated with higher counselor ratings for emotional lability-negativity (at age 7) that contributed to poorer emotion regulation (at age 8), which was predictive of increases in internalizing symptomatology (at ages 8 and 9), with prior levels of symptomatology and emotion regulation controlled. Taken together, child maltreatment, which includes physical neglect as

well as physical or sexual abuse, undermines competent emotion regulation with broader implications for the development of internalizing and externalizing symptomatology.

What motivates the patterns of emotional dysfunction exhibited as a consequence of child maltreatment? It is reasonable to expect that developing a capacity to anticipate and detect adult anger would be an important self-regulatory goal in the context of a home environment characterized by the potential for physical harm. Anticipating adult anger enables the child to prepare emotionally in various ways. This would be consistent with the emotion regulation strategy of attention deployment: focusing on elements of the environment that contribute to emotion management (Gross & Thompson, 2007). There is considerable evidence that maltreated children have an attentional bias toward threatening or sad stimuli (see Pollak, 2015, for a review). For example, children with a history of physical abuse tend to anticipate anger or sadness in situations evoking different emotions (Perlman, Kalish, & Pollak, 2008), they exhibit greater physiological vigilance in the presence of adult anger (Pollak, Vardi, Putzer Bechner, & Curtin, 2005), they show a response bias toward angry facial expressions (Pollak, Cicchetti, Hornung, & Reed, 2000), and this attentional bias mediates children's greater negative emotion in response to peer provocation compared to nonabused children (Shackman & Pollak, 2014).

Vigilance for threat and danger is also apparent neurobiologically. Using different wave forms of the event-related potential as indices of neural attention and processing of visual stimuli, for example, several studies have shown heightened event-related potential responses to pictures of facial displays of anger compared to other facial expressions in maltreated children as young as 1 year old (Cicchetti & Curtis, 2005; Curtis & Cicchetti, 2011; Pollak, Cicchetti, Klorman, & Brumaghim, 1997). In addition, maltreated children show complex dysregulated patterns of stress reactivity, indexed by basal or acute cortisol reactivity (see Gonzalez, 2013; Tarullo & Gunnar, 2006, for reviews). Some children exhibit elevated basal cortisol levels or hyperreactivity to stressors compared to typical children, consistent with the responding of neurobiological systems that have become stress reactive. Other maltreated children show a lower, flat diurnal cortisol pattern or hyporeactivity to stressors, which may reflect taxed neurobiological systems, consistent with allostatic load. In either case, basal cortisol regulation and/or acute stress reactivity is compromised. Finally, there is increasing evidence for elevated levels of proinflammatory markers in children and adults who have experienced maltreatment, which is also consistent with the neurobiological consequences of chronic and severe stress (Gonzalez, 2013; Hostinar, Nusslock, & Miller, 2017). Taken together, the research literature on child maltreatment shows multilevel systems that have adapted to conditions of chronic threat with behavioral and biological manifestations of vigilance and preparation for attack.

Physically abused children are thus sensitized (not habituated) to repeated signals of adult anger in the home, perhaps because this sensitivity enables them to anticipate and prepare for aversive encounters with adults who have harmed them in the past. In a sense, if one cannot avert an encounter with an abusive adult, it is emotionally helpful to be able to anticipate it and flee, avoid, or otherwise prepare for it. From this perspective, it is difficult not to interpret this attentional threat vigilance as a form of emotion regulation in the context in which it develops. It does not directly promote emotional well-being, but it may substitute for this goal if it supports an enhanced sense of control that is important to emotion management by anticipating and potentially preparing for adult anger before it results in harm (Cole et al., 2017). To be sure, this research also documents the immediate and downstream deleterious consequences of this attentional bias, including greater aggression toward peers, greater emotional lability and negativity, and long-term enhanced risk for internalizing and externalizing symptomatology. These reflect, in a sense, the double-edged sword of emotion regulation created by living with a physically abusive parent: the self-regulatory strategies that promote immediate coping come with significant risks for other forms of emotion dysfunction (Thompson & Calkins, 1996). However, it is difficult to imagine how better young children could cope with emotionally challenging circumstances like these or how their immediate coping in these circumstances would not increase risk for emotional dysfunction in other contexts or in later years.

It is important to note that children who are physically neglected do not show the anger sensitivity of physically abused children, but rather heightened sensitivity to sadness expressions and poorer discrimination of emotional expressions generally (Pollak et al., 2000). Although the origins of physical neglect are complex and multifaceted, the central challenge for children in these circumstances is discriminating signs not of adult hostility but of adult capability, and this may account for neglected children's attentional sensitivity to adult sadness in an environment of limited responsiveness and affective reciprocity. This differentiation between physical abuse and physical neglect is important insofar as both forms of child maltreatment contribute to the development of forms of emotion dysregulation that are adapted to their conditions, and are adaptive for providing a limited means of emotion self-management by anticipating the adult's behavior.

One does not have to go so far as a physically threatening home environment to identify further examples of how conditions that confer risk for emergent psychopathology motivate children's pursuit of alternative goals to those characteristic of more typical family settings. Coercive home environments are characterized by mutually escalating aversive encounters between parents and children that are associated with children's emotion dysregulation, oppositional and aggressive behavior, and elevated risk for conduct problems (Patterson, DeBaryshe, & Ramsey, 1989). The child's oppositional behavior and emotional lability are typically viewed as deriving from and maintained by negative conditioning as they provide a means of escape when the adult backs down in the face of the child's escalation of aversive behavior. In Beauchaine and Zalewski's (2016) formulation, temperamental characteristics like impulsivity confer enhanced risk for the effects of coercive family processes, especially as continued family conflict alters over time the multiple biological systems affected by chronic stress (as described above) and causes impulsivity to become traitlike, thus increasing risk for emotion dysregulation and externalizing disorders. This multilevel approach retains, however, the original view of coercive family theory that these reflect behavioral (and biological) adaptations to an adverse family environment, permitting children some measure of control and escape from family conflict, even though they carry immediate and subsequent risks to emotional health. By contrast with goals focused on threat vigilance in physically abusive families, the emotion goals underlying the development of emotionally dysregulated responding in psychologically coercive families concern escaping from ongoing conflict.

Growing up in the context of maternal depression presents a different set of emotional challenges for young children

(Goodman & Gotlib, 1999). Depressed mothers tend to be less positive and responsive to their children, engage in more critical and hostile behavior, and enmesh children in their own affect by adopting negative attributional biases toward their children, combined with helplessness in remedying their own condition (Rogosch, Cicchetti, & Toth, 2004). In addition to being unsupportive and emotionally unavailable, chronically depressed mothers make it difficult for children to effectively manage their emotions by involving the child in parental distress and enhancing children's feelings of responsibility for it. Consequently, their children are at heightened risk of emotion dysregulation and internalizing disorders, diminished self-concept and poorer social competence (Maughan, Cicchetti, Toth, & Rogosch, 2007), along with biomarkers indicating greater stress reactivity and immunological compromise (Ulmer-Yaniv, Djalovski, Priel, Zagoory-Sharon, & Feldman, 2018). In the context of these strong and conflicting emotional demands on them, young children tend to be vigilant and attentive to their mother's emotional state (Zahn-Waxler & Kochanska, 1990). In addition, there is evidence for enhanced empathy and greater prosocial initiatives by the young children of chronically depressed mothers, perhaps as a means of providing helpful assistance to reduce the mother's affective distress, but with the cost of children becoming further enmeshed in the mother's emotional difficulties (Radke-Yarrow, Zahn-Waxler, Richardson, Susman, & Martinez, 1994). There are also indications that this style of interaction extends to others outside the family, including peers, leading researchers to conclude that young children with a depressed parent have "learned to treat others carefully" (Zahn-Waxler & Kochanska, 1990, p. 227). In addition to maintaining ongoing vigilance of the mother's affective state, therefore, young children also have the goal of managing the mother's emotions as a means of managing their own, albeit with limited success, and thus at risk to their own continuing emotional well-being.

Even in more "typical" family circumstances, there is considerable evidence that children are motivated to pursue goals that may provide immediate coping at a cost of long-term risk for affective psychopathology. The extensive research on the responses of young children to marital conflict show that aversive encounters between parents are upsetting to children and undermine their emotional security in the family and their emotion regulation, contributing to enhanced risk of behavioral difficulties and internalizing problems (see review by Cummings & Davies, 2010). Considerable research shows that exposure to chronic marital conflict causes children to develop heightened sensitivity to parental distress and anger, strive to manage parental conflicts by becoming overinvolved in parental disputes, and regulate their exposure to intrafamilial conflict. Although this may provide some management of their own emotional arousal when parents are arguing, the double-edged sword of their coping is reflected not only in children's heightened risk for affective psychopathology but also in the development of insecure representations of relationships that extend outside the family. These are perhaps inevitable consequences of the immediate goal of managing parental conflict coupled with their continued sensitivity to parents' emotional and relational well-being.

Interim conclusions

There are other examples of how children who are emotionally dysregulated and at heightened risk of affective psychopathology may be motivated to achieve goals for emotion management that are atypical, and which provide some immediate coping at the cost of longer term dysfunction. For example, young children at heightened genetic risk for anxiety disorders show hypervigilance to threat in situations previously associated with fearful events. They also exhibit attentional orienting toward anxiety-provoking stimuli, and a tendency to construe benign situations as disproportionately negative or threatening. They do so, often with parental enablement and support, in order to manage exposure to anxiety-provoking situations, even though this has dysfunctional longer term consequences (Thompson, 2001). As this and the preceding examples illustrate, biological processes—including altered stress neurobiology, heightened inflammation, and heritable traits—interact with characteristics of challenging family environments to potentiate their influence and strengthen motivation toward immediate emotional coping and heightened risk of emotion dysregulation.

Taken together, this research offers several conclusions. First, emotion dysregulation is based not only on inappropriate or dysfunctional strategies of reacting emotionally to events but also—perhaps primarily—on antecedent strategies in anticipation of those events. Considering again the model of emotion regulation outlined by Gross and Thompson (2007), several kinds of emotion regulation strategies are antecedent to the response to an emotionally evocative event, including situation selection (choosing actions or settings that change the probability of encountering an emotion elicitor), situation modification (changing the circumstances to alter their emotional impact), and attentional deployment (directing attention within a situation to modify its emotional influence). The preceding discussion of children at risk for affective psychopathology in difficult family environments illustrates the functioning of these antecedent strategies, including situation selection (e.g., the avoidance of anxiety-provoking stimuli or of marital conflict), situation modification (e.g., providing comfort to a depressed mother or intervening into parental arguments), and attentional deployment (e.g., sensitivity to anticipatory cues of adult anger, sadness, or distress, and vigilance for emerging domestic conflict or a parent's depressive episode). In typical circumstances, these antecedent strategies might contribute to emotional well-being in children as they do for adults, but the preceding discussion shows how enlisting these strategies in difficult family contexts is motivated by the need for immediate coping but often also heightens young children's immediate vulnerability and their longer term risk for affective psychopathology. Understanding that many challenges leading to the development of emotion dysregulation concern strategies that are antecedent to (and in anticipation of) emotion-eliciting events can be helpful in considering potentially helpful intervention avenues.

Second, manifestly dysregulated emotional responding may derive from coping strategies that are among the few options permitted in difficult home environments. A young child whose engagement with social or learning tasks is impaired by threat vigilance is not only emotionally dysregulated but also responding adaptively, behaviorally and biologically, to a history of physical abuse, domestic conflict, or anxiety. Not only vigilance to potential danger but also heightened sensitivity to adult sadness and emotional lability in family conflict can simultaneously reflect emotion dysregulation and also reflect efforts to cope emotionally with challenging situations, especially when more adaptive strategies are impossible. Viewed in this light, it seems apparent that to describe children in these circumstances as emotionally dysregulated offers a useful but limited perspective on their behavior. In addition, it is necessary to inquire into the goals they may be

motivated to achieve, and the means for achieving those goals in the circumstances in which they live, to better understand their behavior.

Third, many situations involve multiple goals, and emotion regulation often requires trade-offs among them. There can be multiple goals in immediate circumstances, such as determining how to respond to a depressed mother with respect to managing one's own feelings, helping the parent, defending oneself from criticism, soliciting assistance from the other parent, or escaping the situation. These goals cannot all be accomplished at the same time, and choosing among them requires an assessment of current circumstances and the consequences they potentially entail, including the trade-offs in their emotional outcomes (e.g., escaping the situation may provide immediate relief but unknown and potentially hazardous consequences upon return). There can also be multiple emotional goals relevant to longer term outcomes, as many of the foregoing examples illustrate. In challenging circumstances, immediate coping in the context of limited options comes at a price of longer term vulnerability. It is thus often true that, in these situations, emotional behavior can be both adaptive and maladaptive within different time frames and in relation to different goals. Emotion dysregulation is especially likely when multiple goals are impeded or impaired in a particular context, or when essential goals are accomplished at very high cost.

Fourth, it follows that strategies of emotion regulation are not inherently adaptive or maladaptive, rather, it depends on the context. Studies of adult emotion regulation have concluded that strategies of cognitive reappraisal, problem solving, and acceptance are adaptive for emotion management, while strategies such as suppression, avoidance, and rumination are not (e.g., Gross & John, 2003). However, as Aldao (2013) notes, context is an important determinant of the efficacy of these emotion regulation strategies for adults, and context is especially important for conditions posing risk for psychopathology, especially for children. Cognitive reappraisal is unlikely to be an effective strategy for emotion self-regulation for children living in violent families, for example, whereas in the studies described above, threat vigilance (analogous perhaps to rumination) promotes immediate coping although at a cost of longer term vulnerability. Stated differently, apart from consideration of context, goals, and the time frame, judgments of emotion dysregulation based on strategy alone should be made cautiously.

Fifth and finally, this discussion underscores that the development of emotion dysregulation, like the development of emotion regulation, is inherently relational. This is also consistent with a functionalist approach to emotion dysregulation. In particular, the family environment shapes the emotional demands with which children must cope, the models of emotionally regulated or dysregulated behavior that they observe, the emotional climate in which skills of emotion management evolve, the strategies that are effective or ineffective, the emotional goals that are paramount, the manner in which children's emotions are evaluated by others, and a broad variety of other interpersonal influences. Because emotion dysregulation is a transdiagnostic feature of most forms of psychopathology, it has been natural to view emotion dysregulation as a transcontextual characteristic of the person to be addressed through individual therapy. However, in its development, especially early in life, relational influences are paramount in shaping the behavioral and biological qualities that contribute to emotion dysregulation. This issue is considered further in the next section.

Developing Relationships and Developing Biology in Emotion Dysregulation

Although it is primarily concerned with the development of emotion regulation, the research on family influences in emotional development evocatively highlights at least four ways that family processes contribute to the development of emotionally dysregulated behavior (Morris, Silk, Steinberg, Myers, & Robinson, 2007; Thompson, 2013).

First is the general emotional climate of the family: the relative amounts of positive or negative emotion expressed by family members, together with the predictability of these emotional expressions. The developmental profiles of children at risk for emergent psychopathology discussed above are consistent in portraying family environments as emotionally insurmountable in ways that overwhelm developmentally appropriate emotion regulation skills and motivate children to pursue atypical goals that promote their emotion management in the context of immediate coping. The emotional climate of the family not only shapes goals for emotion management but also defines the kinds of strategies that are likely to provide relief for the child.

Second, young children acquire modes of emotional responding and management from their observations of parents. In many cases, observational learning complements and potentiates the influence of shared genes. Thus it is not surprising that, for example, the 4- to 7-year-old daughters of depressed mothers tended to emulate the more passive, less competent styles of emotion management of their mothers (Silk, Shaw, Skuban, Oland, & Kovacs, 2006). In a similar manner, young children with anxiety disorders learn anxious appraisals and avoidance of fear-provoking situations from their parents, who may share the child's genetic risk for anxious symptomatology (Dadds, Barrett, Rapee, & Ryan, 1996).

Third, parenting practices directly related to the socialization of emotion also influence the development of emotionally dysregulated behavior. In a meta-analysis, for example, Johnson, Hawes, Eisenberg, Kohlhoff, and Dudeney (2017) showed that child conduct problems are predicted by parents' nonsupportive emotion socialization practices, especially those directed toward children's negative emotions, and that this influence is greater with younger children. Nonsupportive practices include minimizing or punishing children's emotional expressions, refusing to talk about the meaning or significance of the child's feelings, and frequent expression of negative emotion, especially toward children. They noted that over time, child conduct problems and parents' nonsupportive emotion socialization practices became mutually influential, and thus emotion socialization had compounding effects. Parents' emotion socialization has also been found to be influential in the development of children's internalizing problems (Schwartz, Sheeber, Dudgeon, & Allen, 2012).

Fourth and finally, the general security and affective tone of specific parent–child relationships influence emotional development and the growth of emotion dysregulation. Secure attachments to parents, for example, promote the growth of constructive forms of emotion self-regulation, and conversely, insecure attachments contribute to emotion dysregulation because of the adult's lack of responsiveness to the child's feelings, psychological unavailability when children are distressed, and the unpredictability of their support (Brumariu, 2015). Some attachment researchers argue that patterns of emotion dysregulation that result, including the intense distress of insecure–resistant children and the disoriented, dissociation-like responding of insecure–

disorganized children, are adaptations to patterns of parental care by which young children manage themselves in the context of expectations of parental responsiveness (Cassidy, 1994). That these patterns of emotion dysregulation confer longer term risk for affective symptomatology has been demonstrated empirically (e.g., Bosquet & Egeland, 2006) and is based, in part, on the development of internal "working models" by which children generalize their expectations for emotional responsiveness from the parent–child relationship to other relationships.

In difficult family environments, of course, these multiple influences on the development of emotion dysregulation tend to overlap and amplify their effects. An example is when parents have borderline personality disorder (BPD). Parenting by adults with BPD is characterized by pervasive emotion dysregulation along with hostility and impulsivity, controlling behavior, harsh reactions to children, and erratic, mood-dependent responsiveness. Linehan (1993) and Musser, Zalewski, Stepp, and Lewis (2018) have further described the emotionally "invalidating environment" created by BPD parents who misattribute children's emotions, minimize children's emotional problems, respond only to extreme emotional expressions, and contribute to children doubting and "self-invalidating" their own emotional experiences. These circumstances encompass a harsh family emotional climate, poor parental modeling of emotion regulation, a variety of nonsupportive emotion socialization practices, and quite likely, insecure attachment relationships. In a recent study, children's emotion dysregulation mediated the association between maternal borderline and antisocial symptomatology and children's internalizing and externalizing symptoms a year later (Kaufman et al., 2017).

Parenting practices are important not just as direct influences on the development of emotion dysregulation, especially early in life, but for their interaction with developing biological systems that are also potent influences on emotion dysregulation. The following sections profile examples of this interactive process, and illustrate parenting practices as catalysts and moderators of individual differences in these biological processes.

Neurobiological consequences of stress and its social buffering

In the examples of emergent psychopathology discussed above, young children exhibited biological as well as behavioral dysregulation. Complex patterns of dysregulation of stress neurobiology were especially apparent in studies of maltreated children, but the extremity of maltreatment is not required to dysregulate activity of the limbic–hypothalamic–pituitary–adrenocortical (L-HPA) axis and other neurobiological stress systems. Studies of children living in the context of chronic maternal depression, foster care placement, interparental violence, and poverty have documented that as early as the first year, young children exhibit alterations in basal and/or acute cortisol responding that can cause, as in the case of maltreatment, hyperreactivity (reflecting sensitization) or hyporeactivity (thought to reflect systemic exhaustion) of stress responding (see Thompson, 2014, for a review). That biological dysregulatory effects derive primarily from the consequences of relational influences in these contexts, rather than from resource depletion or other causes, comes from studies, discussed below, showing that positive relational influences can buffer these neurobiological outcomes. There are three additional observations about the neurobiological effects of stress and its social buffering meriting note.

One is that these influences begin prenatally. Experimental animal studies and correlational research with humans indicate that prenatal maternal anxiety and stress, and prenatal maternal cortisol levels, predict newborn stress reactivity and fearful and difficult temperament in the first 2 years and beyond (Blair, Glynn, Sandman, & Davis, 2011; Davis, Glynn, Waffarn, & Sandman, 2011). These and other studies in the expanding research literature on fetal programming are consistent with evidence for fetal exposure to maternal stress hormones and their influence on developing behavioral and biological functioning (see Davis & Thompson, 2014, for a review). These origins of individual differences in emotion dysregulation thus begin before birth and are a foundation for the infant's response to environmental experiences.

The biological dysregulation deriving from chronic stress also extends beyond the L-HPA axis to other systems because glucocorticoid receptors are widely distributed throughout the brain and because L-HPA dysregulation has downstream effects on other systems. These include impairment to major neurotransmitter systems relevant to the development of internalizing and externalizing disorders as well as neurodegenerative effects on sensitive brain regions, including the hippocampus and the prefrontal cortex, which have behavioral consequences for memory, executive function, and emotion regulation (Arnsten, 2009; Mead, Beauchaine, & Shannon, 2010). Neural networks important to emotion regulation are also affected, including abnormal amygdala–prefrontal cortical connectivity as a consequence of early life stress (Chen & Baram, 2016). Structural and functional dysregulation of this circuit has been related to the development of anxiety disorders in children (Swartz & Monk, 2014), and this dysregulation can be found as early as the newborn period in infants born to prenatally depressed mothers (Posner et al., 2016). In addition to these, early life stress disrupts the interaction between neurological and immune systems, contributing to enhanced risk for physical and mental health problems, including depression (Hostinar et al., 2017). Taken together, early chronic stress provokes a cascade of neurobiological changes that together increase risk for diminished self-regulatory capabilities and increased emotion dysregulation.

Early life stress has complex origins, but the primary and most potent stressors are social and relational in nature: maternal depression or anxiety, domestic conflict or interparental violence, and disengaged and emotionally inaccessible parenting (e.g., Sturge-Apple, Davies, Cicchetti, & Manning, 2012). However, relational influences can also buffer the effects of stress on early neurobiological functioning (Hostinar, Sullivan, & Gunnar, 2014). In a study of families living in rural poverty, for example, researchers found that infants' chronic exposure to domestic violence was associated with elevated stress reactivity by age 2 years. When mothers in these families were observed behaving sensitively with their children in earlier home observations, however, repeated exposure to domestic violence was not associated with heightened stress reactivity in the children (Hibel, Granger, Blair, Cox, & Family life Project Key Investigators, 2011). Based in part on findings such as these, several evidence-based interventions have been developed for infants and children with maltreatment histories that are designed to improve the sensitivity, warmth, and responsiveness of their care providers in foster care (Dozier, Peloso, Lewis, Laurenceau, & Levine, 2008; Fisher, Van Ryzin, & Gunnar, 2011). Each program succeeded in normalizing the heightened levels of cortisol reactivity that children showed when they entered the program, and there were also concurrent behavioral changes, including the development of more secure attachments to foster parents. Not enough is currently

known about whether the biological processes involved in social support primarily buffer the influence of stress-reactive systems or also strengthen systems relevant to coping and emotional well-being. Candidates for the latter include changes in the oxytocinergic system and improvements in prefrontal cortical functioning (Hostinar et al., 2014).

Early physiological attunement

The research on fetal programming indicates that before birth, fetal biological and behavioral development is affected by maternal stress and its transmission to the fetus through maternal cortisol levels. When mothers are stressed prenatally, the constellation of characteristics that develop in the fetus increase risk for emotional dysregulation after birth (e.g., fearful and difficulty temperament in newborns) but are consistent with the view that fetal development is being prepared for coping with an extrauterine environment of challenge and stress (e.g., the newborn's heightened stress reactivity).

Another kind of early biological/behavioral transmission can be observed in the research on mother–infant physiological attunement. This research focuses on the biological and behavioral coordination of infant and mother to provide physiological support for the infant's self-regulatory development and the growth of affiliative bonds between them (Feldman, 2012). For a young infant whose capacities for physiological and emotion regulation are limited, the mother's ability to respond sensitively promotes the attunement of her physiological state (such as cardiac rate) with the infant's and helps regulate the baby's state. This attunement also provides a foundation for a positive, secure parent–child relationship. This research shows, however, that individual differences in attunement are predicted by maternal stress and affective symptomatology and predict infant risk for emotion dysregulation. In one study, for example, mothers with depression and anxiety disorders had greater difficulty establishing affective attunement with their 9-month-olds who, in turn, showed greater stress reactivity and poorer fear management than control children (Feldman et al., 2009).

Physiological attunement between mother and child can promote early biobehavioral organization but can also set the stage for developing problems in emotion dysregulation when mothers are chronically stressed, even in the absence of symptomatology. In an experimental study, mothers experienced a modified Trier stress test involving extemporaneous speaking before judges who either negatively or positively responded to them, and then mothers were reunited with their 1-year-olds. The mother's physiological arousal deriving from each condition was mirrored in the infant's increased cardiac activity after reunion, but this was greater for mothers in the negative evaluation condition. Moreover, only when mothers were in the negative evaluation condition did infants' physiological synchrony with her arousal increase over time (Waters, West, & Mendes, 2014). Waters et al. argued that this physiological attunement can contribute to affective contagion in shared circumstances. In another study, mothers were randomized to have either a positive or a conflictual discussion with their marital partners, and then were reunited with their 6-month-olds, after which the infants were observed during mild challenge tasks. Mothers' cortisol reactivity during conflictual discussions, but not positive discussions, predicted infants' cortisol reactivity to the challenge tasks after their reunion (Hibel & Mercado, 2019).

Considerably more research is needed to examine further the significance of the transmission of physiological states to what is implied by these studies, especially the means by which this transmission occurs and why emotionally negative arousal is more likely to be conveyed than positive. Together with the research on fetal programming, however, these studies suggest that the early years may be a period of unusual susceptibility of the infant to the mother's physiological and emotional states. This susceptibility derives from the prenatal entraining of the infant's biobehavioral development to signals from the mother's physiological state, and after birth this susceptibility contributes to organizing and regulating early biological and behavioral functioning until the infant can become more independently self-regulating. These findings indicate, however, that vulnerability to the mother's stress and affective difficulties inhere in these developmental processes, and underscore how early the transmission of risk for emotion dysregulation may emerge.

Differential susceptibility

The discussion thus far has emphasized risk factors for the development of emotion dysregulation arising from the interaction of challenging family environments and biological characteristics of children. The approach is consistent with a diathesis-stress orientation that has historically been dominant in developmental psychopathology, in part because of its direct applications to interventions to prevent or remediate conditions that enhance vulnerability for at-risk children. However, it is not the only orientation that can be taken to the interaction of biology and environment in the development of emotion dysregulation.

From the perspective of differential susceptibility, individuals vary not only in risk factors but also in their general susceptibility to environmental influences (Belsky & Pluess, 2009). According to this view, some people are more readily influenced by their environments than others. For more susceptible individuals, the environment has the potential of affecting them "for better *and* for worse" such that they experience greater negative outcomes when environments are stressful (consistent with the diathesis-stress model), but also exhibit greater positive outcomes when environments are supportive. For less susceptible individuals, outcomes are less significantly moderated by environmental quality. Groups that are more susceptible are often viewed as being more vulnerable because research studies (until recently) have typically only focused on their responses to adversity, not on how they function in both adverse and supportive circumstances. Once they are studied in both contexts, positive and negative outcomes associated with their susceptibility factors can be better identified.

Many of the risk factors for emotion dysregulation discussed thus far, including negative emotionality, physiological reactivity, and difficult temperament, have been identified in other studies as susceptibility factors that increase vulnerability in challenging environments (consistent with the foregoing review) but foreshadow more positive outcomes in supportive environments. Additional susceptibility factors identified in other studies consist of specific genetic alleles (e.g., *5-HTTPLR* and *DRD4* 7-repeat), temperamental qualities (including high impulsivity and high fearfulness), and other biomarkers such as high respiratory sinus arrhythmia or skin conductance (Belsky & Pluess, 2009). Although many of these variables appear self-evidently to confer enhanced risk for emotion dysregulation, the view that they would yield more positive outcomes for emotional behavior under more supportive environmental conditions suggests that the vulnerability they confer is not biologically determined but rather in interaction with the environment. Furthermore, the differential

susceptibility literature suggests that if those environmental conditions were improved, biological characteristics conventionally interpreted as conferring vulnerability to emotion dysregulation might instead prove more beneficial.

Here is an example. Considerable research indicates that insensitive and harsh parenting increases risk for the development of externalizing disorders. There is also evidence that the *DRD4* 7-repeat polymorphism causes poor dopamine reception and is linked to aggression, oppositional behavior, and other forms of externalizing behavior. To study the interaction of these factors, Bakermans-Kranenburg and van IJzendoorn (2006) observed 10-month-old infants with their mothers to assess the quality of parenting and also genotyped cheek cells obtained from the child; later, maternal ratings of the child's behavior were obtained. Children with mothers deemed insensitive later were rated higher in externalizing behavior but only when they had the *DRD4* 7-repeat allele; for children without this genotype, insensitivity was unpredictive of externalizing. Similar results were found for ratings of aggressive and oppositional behavior. This is an example of gene–environment interaction.

Based in part on these findings, this research group subsequently recruited a sample of families with 1- to 3-year-olds who were high in externalizing behavior and invited the parents to participate in a parenting program designed to enhance sensitivity and positive discipline. For children with the *DRD4* 7-repeat allele, the intervention was effective in decreasing externalizing behavior on the follow-up assessment, whereas for children without the allele, the intervention was ineffective. Significantly, the program showed greatest influence on children's externalizing behavior when parents showed the greatest increases in sensitivity (Bakermans-Kranenburg, van Ijzendoorn, Pijlman, Mesman, & Juffer, 2008). Taken together, this is an example of differential susceptibility, with the young children with the *DRD4* 7-repeat showing greater vulnerability to externalizing behavior in the context of insensitive parenting, but showing greater benefits resulting from an intervention designed to increase parental sensitivity.

The importance of differential susceptibility is both the challenge it presents to diathesis-stress formulations that have long been conventional to thinking in developmental psychopathology, and the emphasis it places on the environmental context in appraising the influence of intrinsic characteristics of the child that have traditionally been viewed as enhancing risk for affective disorders. One of the most important contributions of this literature is that in alerting developmental researchers to their failure to examine the influence of these characteristics outside of typical contexts of environmental adversity, it suggests that changing environmental conditions for the positive has significant potential for altering the developmental consequences of these characteristics for emotion regulation and dysregulation.

Interim conclusion

Biological and experiential influences, especially in the family, contribute interactively to the development of emotion dysregulation, and these research literatures illustrate emergent views concerning the nature of this interaction (see Thompson & Waters, in press). In particular, it increasingly appears that multiple levels of "under the skin" influences operate not as fixed but as dynamic processes for which experiential influences are catalysts and moderators. Whether considering the "programming" of fetal and infant stress neurobiology by maternal behavioral and physiological influences, the social buffering of stress reactivity and its correlates, or the manner in which the influence of susceptibility factors can be altered by experimental interventions with caregivers, these studies underscore that the multilevel processes contributing to the development of emotion dysregulation are biologically dynamic and experience based (Thompson, 2015).

Such a view of biology × environment interaction is emerging in other fields as well, such as behavioral epigenetics. Epigenetics describes how elements of the chemical environment surrounding DNA can alter gene expression without changes to DNA sequence. There are several ways that the chemical environment can be altered through DNA methylation, histone modifications, and other processes (see Champagne, 2016). Research on behavioral epigenetics underscores two kinds of experiential influences in the early years that are significantly associated with epigenetic changes in gene expression: environmental adversity and parental nurturance (Thompson, 2015). Yang et al. (2013) reported, for example, a higher rate of methylation in a sample of children with histories of maltreatment who had been removed from their parents compared to a demographically matched control group. Meaney (2010), in a series of studies, has shown how variations in maternal nurturance of rat pups induced epigenetic changes in gene expression in offspring that had multigenerational consequences for behavior, coping, and subsequent parental behavior. Taken together, emerging work in behavioral epigenetics with animals and humans indicates that gene activity in behavior and development is not static but dynamic, and that central aspects of experience regulate gene expression. It would not be surprising that experiences of adversity and nurturance, especially early in life, would be central epigenetic regulators in light of the significance of these experiences for guiding modifications of gene expression to adapt to critical aspects of the environment.

These considerations are especially important in light of the conclusion that emotion dysregulation is one of the less heritable risk factors for psychopathology (Beauchaine, 2015). This makes understanding of the experiential—and most important, relational—influences on gene expression and other biological contributors to emotion dysregulation a central research priority, with implications for clinical intervention as well as developmental theory.

Conclusion: What Does the Concept of Emotion Dysregulation Contribute to the Study of Emergent Psychopathology?

Emotion dysregulation is a transdiagnostic element of affective psychopathology. Furthermore, research reviewed above indicates that dysregulation has temporal precedence and likely causal influence on the development of externalizing and internalizing disorders in childhood. These associations are strong, in part because emotion dysregulation is part of the diagnostic criteria for many disorders. Affective disorders are clearly much, much more than simply pathology of emotion dysregulation. However, the concept of emotion dysregulation has the potential of contributing significantly to the study of emergent psychopathology, especially if a developmental perspective contributes a conceptualization of emotion dysregulation that underscores the multiple goals that can underlie manifestly dysregulated emotion, the settings and relationships that help to define those goals, and the complex influence of experience in shaping (and being shaped by) biological processes.

Although researchers and clinicians recognize that competency at the management of emotion varies continuously, the manner in which emotion dysregulation is contrasted with "optimal" emotion regulation in the literature establishes misleading anchors for thinking about the complex processes involved in regulating emotion. It is not just children in emotionally insurmountable environments who struggle to juggle multiple immediate and long-term goals related to coping in those environments, but most people, in the complex social circumstances in which they live, are managing their emotions with complex, sometimes irreconciliable, goals. "Optimal" emotion regulation may be accomplished less commonly than ordinary emotion regulation that achieves some desirable outcomes, but not all (the research literature on family relationships illustrates these outcomes). Viewed in this light, it is also possible to see variations in emotion dysregulation on a continuum in which immediate and longer term costs and benefits of dysregulated responses are considered in relation to the environments in which those responses function. Some forms of dysregulation are better than others. In this manner, better understanding of the origins of dysregulated behavior might be achieved with better understanding of the secondary gain, reinforcement processes, and other means by which this behavior is maintained despite its otherwise dysfunctional consequences.

The development of emotion dysregulation also focuses attention on the bottom-up processes that contribute to dysregulated responses that derive from experiential shaping of stress neurobiology and its correlates, the emotional dynamics of the family, heritable characteristics, early physiological synchrony between mother and infant, epigenetic modification of gene expression, and other processes. These are in contrast with the emphasis in the study of emotion regulation on top-down processes, such as prefrontal control over limbic structures and rational use of self-generated strategies of emotion regulation. Viewing emotion regulation and dysregulation on a continuum suggests that the emphasis of each field reveals potential oversight in the other. Emotion regulation significantly involves the influence of bottom-up processes and their interaction with cognitive and prefrontal control mechanisms (Thompson, 2011; Thompson, Lewis, & Calkins, 2008). Likewise, greater attention to the cognitive processes involved in the development of emotion dysregulation would also be warranted. These might include studying how the situations evoking emotion are appraised, how internal cues of emotional arousal are interpreted, how emotional self-monitoring occurs (or not), deficiencies in emotional self-efficacy, and other top-down cognitive processes that are also likely to contribute to individual differences in emotion dysregulation. Research on abnormal prefrontal–amygdala cortical connectivity as a risk factor for affective psychopathology (Swartz & Monk, 2014) offers another model for considering how the interaction of top-down and bottom-up processes affects emotion dysregulation.

One advantage of a developmental perspective to these issues is that emergent processes contributing to the development of emotion dysregulation can be identified and studied before they have become consolidated and characterological. This perspective is one of the reasons that this discussion has emphasized how emotionally dysregulated responses function in the contexts in which they develop. More broadly, the emphasis on adaptation to these contexts, particularly in developmentally critical environments like the family, is also consistent with an evolutionary-developmental approach to behavioral and biological development (Ellis, Bianchi, Griskevicius, & Frankenhuis, 2017). This approach focuses especially on chronic childhood adversity and the developmental adaptations children require in which apparent impairments in emotionality, learning, and behavior may actually be strengths in the contexts in which children live. Such a developmental orientation may not consistently fit the evidence on emotion dysregulation and emergent psychopathology, but it sets forth a perspective meriting consideration of how, before they have become consolidated to become characterological, patterns of emotional dysregulation emerge early in life as part of a child × context adaptation.

Finally, a developmental perspective emphasizes the critical influence of early relationships, a perspective that is easily lost in the focus on individual psychopathology of the adult literature. The centrality of early relationships is part of the meaning of Donald Winnicott's (1957/1947, p. 137) famous aphorism, "[t]here is no such thing as a baby… you are describing a baby and someone." In the literatures surveyed above, relational experience is the most critical element of the environmental conditions shaping the growth of emotion regulation and dysregulation, and several studies reviewed earlier further attest to the influence of change in relational experience for normalizing disordered patterns of emotional responding in children. Similar influences may be true for adults as well, despite the consolidation of these disordered patterns, and therapy can sometimes serve as an alternative relational experience that promotes greater emotional well-being. Across the developmental spectrum, however, understanding how atypical patterns of emotional experience and expression function in the relational contexts in which individuals live can provide significant perspective on how those patterns may have developed and continue to be maintained, as well as how they might be changed.

Defining emotion dysregulation as patterns of emotional experience and expression that interfere with goal-directed activity is only the beginning to a fuller conceptualization of what those goals are, the functional purposes that may underlie some forms of emotion dysregulation, the influence of relationships in the contexts in which these goals develop, and the complex interaction of experience and biology in how processes of emotion dysregulation emerge. As this definitional conceptualization unfolds, it will also potentially contribute to greater insight into the emergence of developmental psychopathology.

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