

Title: Emotion regulation

**Synonyms:** emotional control; emotion-related self-regulation; stress-regulation; mood-regulation; affect-regulation; emotional intelligence

**Definition:** *Emotion regulation* refers to the conscious or unconscious processes of monitoring, evaluating, modulating, and managing emotional experiences and expression of emotion in terms of intensity, form, and duration of feelings, emotion-related physiological states and behaviors.

## **Introduction**

In order to function in society, in which we are exposed daily to situations in which uncontrolled expression of emotions are not accepted, it is essential to regulate our emotions. Emotion regulation refers to all the processes involved in shaping which emotions one experiences, when emotions are experienced, and how these emotions are experienced and expressed (Gross, 2015). In science as well as in day-to-day conversation, the scope of emotion regulation is often limited to suppressing negative emotions (Kashdan, Young, & Machell, 2015). However, emotion regulation also refers to the down-regulation of positive emotions (e.g., concealing one's enthusiasm about a prospect house in front of the realtor), and to the up-regulation of both positive and negative emotions (e.g., respectively, sharing good news to prolong the excitement, and listening to violent music to get pumped up for a confrontational negotiation at work).

Emotion regulation is one of the fastest evolving fields of psychological study. By highlighting and discussing the main theoretical frameworks of emotion regulation, we will explore the scope and conceptual boundaries of the topic.

Moreover, the current state of knowledge on the relevance of emotion regulation for human development and functioning is addressed, as well as the development of emotion regulation from infancy into adulthood.

## **Defining emotion regulation**

### *Theories of emotion regulation*

Since the early 1990s, empirical interest in emotion regulation increased and different theories on emotion regulation processes emerged, of which the *process model* of emotion regulation has been most influential (Gross, 2015). In this model, emotion regulation refers to all the processes that are involved in changing the duration and intensity of feelings, and emotion-related physiological states and behaviors. These processes can be conscious and controlled, but also unconscious and automatic. The process model is closely connected to the *modal model of emotions*, which describes an emotional experience as the result of the nature of a situation, the attention that is paid to this situation, the appraisal of the meaning of this situation, and the emotional response tendency that determines the behavioral, physiological, and experiential component of the emotion.

The process model builds on the modal model of emotions, by describing how emotion regulation processes can change the experience of emotion at every stage in this process; either by regulation processes activated before the emotion is triggered, referred to as *antecedent-focused regulation*, or by processes that change the emotional response after the emotion is already generated, summarized as *response-focused regulation* (John & Gross, 2004). Examples of antecedent-focused regulation are selecting or adjusting the emotion-eliciting situation — by avoiding a confrontation with a colleague — or adjusting one's focus of attention — by

distracting yourself from a scary picture or by ruminating about a bad grade — or deliberately changing the appraisal of the situation — by reframing arousal due to an important presentation as excitement that will help you focus, rather than anxiety that will increase the chance of failure. Response-focused regulation is characterized by emotional response modulation — by using breathing techniques to calm yourself down. As such, there is a tight link between emotion regulation and coping; a related and partly overlapping concept which describes the more long-term process of dealing with and responding to negative affect or stress (Compas et al., 2017). The process model has recently been expanded to the *extended process model* which additionally describes how emotion regulation strategies are selected and implemented (Gross, 2015).

Whereas the original process model was mainly focused on intrinsic emotion-regulation processes — where an individual regulates its own emotion — it was later extended to incorporate extrinsic or interpersonal processes of regulation, for instance regulation of one’s emotion by a parent, partner or friend (Bloch, Moran, & Kring, 2009). These interpersonal regulation processes predominate early childhood, since young children do not have the cognitive capacity to regulate their own emotions and depend on their caregivers to do so (see also paragraph “Development of emotion regulation”) (Fox & Calkins, 2003). In the last decade, there has been a growing interest in the interpersonal processes by which people seek regulation from others, or regulate emotions of others. Unsurprisingly so, considering that about 98% of emotion regulation takes place in social contexts (Gross, Richards, & John, 2006) and most emotional stressors are interpersonal in nature. The interpersonal regulation of emotion is therefore considered a key

function of social relationships and social proximity (Beckes & Coan, 2011; Cassidy, 1994).

Some theorists have argued that emotion regulation should not only refer to the processes that alter emotions, but also to *emotions as regulator*: all the changes in behavior within the individual or within others that result from the activated emotion (Cole, Martin, & Dennis, 2004). An example of this second type of emotion regulation is if a young child is upset about her mother leaving the room and as a result is whimpering, refrains from playing, and keeps its eyes glued on the door. Many consider this view too broad for the definition of emotion regulation (e.g., Eisenberg & Spinrad, 2004), and emphasize that behavior should only be considered emotion regulation if it is intentional and motivated to achieve a goal, and not a mere response to an emotional situation.

#### *Difficulties in defining emotion regulation*

Emotion regulation processes are for a large part covert and not directly observable. Therefore, emotion regulation is often operationalized as the lack of expression of frustration or anger, or a change in expression of an emotion over time (Cole et al., 2004). However, the question arises whether the absence of emotion is a sign of emotion regulation, or if outward appearance of emotional control might actually be a sign of low arousability.

A distinction is often made between adaptive and maladaptive emotion regulation processes, where the former is considered a helpful way of dealing with emotions, and the latter a harmful way of handling emotions. However, it is difficult to determine which emotion regulation processes should be considered a form of adaptation or maladaptation. In general, the experience and expression of both

positive and negative emotions can be adaptive as well as maladaptive. For example, strong expression of fear or discomfort in the first few years of life, crying, is a sign of healthy development, and an evolutionary adaptation that is essential for survival and wellbeing. Adaptive emotion regulation can thus entail the up-regulation, the down-regulation, and the maintenance of positive or negative emotions (Kashdan et al., 2015).

Whether we label emotion regulation adaptive or maladaptive depends on individual and contextual factors, and on the framework that is adopted. The timing of the consequences influences our appraisal of the chosen strategy. For example, avoiding the experience of fear can be beneficial in the short-term — as it allows for a more focused response to an alarming situation — but has long-term negative consequences — as avoidance is a key symptom of both an anxiety disorder as well as post-traumatic stress disorder. Adaptiveness of emotion regulation processes can also depend on one's individual goals. If a child is hit by a peer, holding in anger could be considered adaptive emotion regulation, if the aim is to maintain the relationship. However, if retaliation, to prevent the wrongdoing from reoccurring, is the goal, the adaptive strategy is to increase anger (Thompson, 1994). Social and cultural influences can also affect how emotion regulation is appraised (Cole, Michel, & O'Donnell Teti, 1994). Although emotional suppression is considered a maladaptive form of emotion regulation in Western culture, with negative short- and long-term outcomes, in Asian culture, characterized by higher interdependency, suppression is considered an adaptive strategy with less harmful or even beneficial outcomes. Lastly, in a more clinical psychology perspective, adaptive emotion regulation allows one to be aware of emotional distress, to understand and accept emotions, to control impulses in order to perform goal-directed behavior, to flexibly

use situationally-appropriate emotion regulation strategies, and to willingly experience negative emotions in pursuit of desired goals (Gratz, Weiss, & Tull, 2015).

## **The relevance of emotion (dys)regulation in human functioning**

### *Emotion regulation*

Individual differences in emotion regulation capacity and strategy exist and can influence developmental processes and outcomes. Already in infancy, children show considerable variation in reactivity to the environment and in the regulatory capacity to modulate this reactivity, summarized in the term *temperament* (Rothbart, 2007). These temperamental differences in experiencing, expressing, and regulating emotions seem to be consistent over situations and over time, and to be biologically based, influenced by heredity, maturation, and experience. Temperament and experience together help grow an individual's personality, a stable set of characteristics that determine one's thinking, feeling, and behavior (Rothbart, 2007). Self-regulation (of emotions) is considered one of the most important elements of personality.

The predictive value of individual variation in emotion regulation has been extensively studied, and ample evidence shows its importance for functioning in a variety of domains. Emotion regulation for instance predicts better social functioning in childhood (Eisenberg, Fabes, Guthrie, & Reiser, 2000) and adults high in emotion regulation are more sensitive and prosocial (Lopes, Salovey, & Côté, 2005). Emotion regulation is also related to academic success in childhood (Graziano, Reavis, Keane, & Calkins, 2007) and professional functioning, demonstrated by higher work performance in adults (Aldao, Nolen-Hoeksema, & Schweizer, 2010).

### *Emotion dysregulation*

When one's individual pattern of emotion regulation impairs or jeopardizes functioning, this is referred to as *emotion dysregulation* (Cole et al., 1994). Emotion dysregulation has many faces; it can be the lack of access to a typical emotion in a pertinent situation — a blockage of anger — as well as having a disproportional domination of a particular emotion — always feeling sad. Moreover, dysregulation can be expressed in the intensity and duration of experienced emotions, or be apparent from emotional instability, or rigidity in emotional experience and expression (Cole et al., 1994). In temperament research, two types of emotional dysregulation are described. Besides the typically functioning group of *optimally regulated* children, exists a group of *highly inhibited* children, who are involuntarily over controlled and rigid, and a group of *under controlled* children, who are generally low in emotion regulation (Eisenberg et al., 2000).

Emotion dysregulation can serve an adaptive purpose in the present, even though it interferes with or has serious implications for adjustment and development (Cole et al., 1994). For example, it is a well-known phenomenon that survivors of parent-child incest do not recollect either a part or all of their abusive experiences, and experience a sense of emotional cut-off from the situation. This form of emotion dysregulation helps one handle and survive the intense emotions and generalized distress of the incest, but also leads to a serious truncation of emotionality that seriously hampers (social) functioning in adulthood.

Although emotion dysregulation does not necessarily imply a psychiatric condition or clinical concern, it is considered a general vulnerability for developing psychopathology (Cole et al., 1994). Studies on emotion regulation and

psychopathology have often focused on specific regulation strategies that are usually considered adaptive, for instance reappraisal (of a stressful situation) and problem solving, versus strategies that are considered maladaptive, for instance suppression (of negative thoughts) and avoidance (see "*Difficulties in defining emotion regulation*" for a commentary on the equivocal distinction between maladaptive and adaptive strategies). An elaborate meta-analysis showed that in adults, maladaptive strategies, including rumination, avoidance, and suppression of emotion, are related to higher levels of psychopathology, whereas adaptive strategies, including problem solving, acceptance, and reappraisal, are associated with less psychopathology (Aldao et al., 2010). Maladaptive strategies were more strongly related to psychopathology than adaptive strategies. This finding may indicate that the use of maladaptive emotion regulation is more harmful than the relative absence of particularly adaptive ways of regulating one's emotions (Aldao et al., 2010). Mood-related disorders, including the internalizing disorders of anxiety and depression, were more strongly related to emotion regulation strategies than externalizing disorders, including substance use disorders, in which problem behavior is directed toward the environment. Surprisingly so, the adaptive strategies of reappraisal and acceptance were not strongly related to (to absence of) psychopathology, although these strategies play a prominent role in two major therapeutic approaches: acceptance-based treatment and cognitive behavior therapy (Aldao et al., 2010). A meta-analysis with a similar framework focused on children and adolescents, showed that adaptive emotion regulation was related to lower levels of internalizing as well as externalizing problems (Compas et al., 2017). In contrast to the study of Aldao et al. (2010), little evidence was found for an association between specific emotion regulation strategies and problem behavior (Compas et al., 2017).

The close link connection with psychopathology is further illustrated by the fact that emotion dysregulation is central in the definition of many psychiatric disorders, as described in the *Diagnostic and Statistical Manual of Mental Disorders* (DSM), including amongst others, mood disorders, Attention-Deficit/Hyperactivity Disorder (ADHD), substance- or alcohol-dependency, borderline personality disorder, schizophrenia, and suicidal ideation (Crowell, Puzia, & Yaptangco, 2015). In general, many of the psychiatric disorders in the DSM appear to coexist, a phenomenon named *comorbidity*. For example, of every person meeting the diagnosis of major depressive disorder, about 50% also meet the criteria for a second DSM-disorder (Caspi et al., 2014). A variety of theoretical and empirical studies have tried to explain this comorbidity, and results suggest emotion dysregulation to be a common trait. In children and adolescents, a distinctive diagnostic profile has been described, for youth that exhibit a combination of severe emotional, attentional, and behavioral dysregulation, named the *dysregulation profile* (Ayer et al., 2009). This general pattern of dysregulation in childhood marks an early risk of persisting deficits in regulation of emotions, cognitions, and behavior, underlying a variety of severe psychiatric disorders in adulthood. In adults, attempts to derive empirically an overarching construct that can more parsimoniously describe different psychiatric disorders, have also demonstrated an underlying dimension which unites all psychiatric disorders (Caspi et al., 2014). Similar to the empirical findings in childhood, it was found that problems in regulation or control when dealing with others, the environment, and the self, lie at the core of this dimension (Beauchaine, 2015; Caspi et al., 2014). Emotion dysregulation is even proposed to underlie a variety of physical health problems, including cardiovascular disease, type II diabetes, and sleep problems (Crowell et al., 2015). The risky and unhealthy

behaviors of individuals with regulation problems, including emotional overeating, excessive smoking and drinking, and the exposure to prolonged stress, are hypothesized to explain this link between emotion dysregulation and physical health.

Psychological interventions aimed at reducing emotion dysregulation and improving emotion regulation skills are effective methods in prevention and treatment of psychopathology (Compas et al., 2017). Empirical research shows that many interventions, including cognitive-behavioral and acceptance-based behavioral interventions, influence emotion regulation and that changes in emotion regulation as a result of these interventions are related to changes in clinically relevant outcomes (Gratz et al., 2015). Emotion regulation is also implicated in the increasingly popular prevention and intervention method of *mindfulness* training. Mindfulness is a psychological construct derived from Buddhism which emphasizes the importance of purposefully and non-judgmentally paying attention to the present moment. Mindfulness (training) is considered a useful method to reduce stress and increase wellbeing, and initial empirical studies show that emotion regulation could be the driving mechanisms explaining its beneficial effects (Roemer, Williston, & Rollins, 2015). Although emotion regulation improvements appear to be a means for preventing and alleviating psychological problems, more research is needed to clarify which elements of interventions are effective in improving emotion regulation, and which emotion regulation strategies are subject to change.

### **Development of emotion-regulation**

To understand the development of emotion regulation it is necessary to address firstly the underlying processes that are involved in adapting the experience and expression of emotions. Emotion regulation requires, for instance, the ability to

recognize the emotional significance of a situation, to appreciate the need for regulation, and then to select and implement appropriate strategies to regulate these emotions (Ahmed, Bittencourt-Hewitt, & Sebastian, 2015). In all these steps in the process of emotion regulation, several (cognitive) processes are involved, including attention, inhibition, modulation of arousal, and executive functions: the higher-order cognitive functions seated in the prefrontal cortex, including cognitive flexibility, working memory, and planning of coordinated action (Fox & Calkins, 2003).

Emotion regulation development is impacted by both biological and innate factors, including the temperamental disposition of a child, cognitive capacity, and the workings of neural and physiological systems that are involved in regulation and control, as well as environmental influences, including parental socialization, and influences of peers or siblings (Fox & Calkins, 2003).

### *Biological nature of emotion regulation*

In the last decades, the biological nature of emotion regulation is being unraveled by empirical studies, taking full advantage of the technological advances in research fields on physiology and neurobiology. Behavioral and molecular genetic studies demonstrate that processes involved in enabling emotion regulation are moderately heritable (estimates vary between 25-55%) and that specific genetic variation (more precisely, common variations in 5-HTT gene and COMT genes) might be involved in emotion regulation processes or brain activity in areas related to emotion regulation (Hawn, Overstreet, Stewart, & Amstadter, 2015). On a neurobiological level, emotion regulation is described as the result of the interplay between bottom-up processes — driven by subcortical brain networks that mature early in life and are involved in emotion activation, such as the amygdala — and top-

down processes — driven by cortical brain networks which develop until early adulthood and are involved in regulatory processes, such as the prefrontal cortex (Thompson & Goodman, 2010). The prefrontal cortex, the cerebral cortex which covers the frontal part of the frontal lobe, has a central role in decision making, planning, and other higher-order cognitive functions (executive functions) and therefore controls many of the prerequisites for emotion regulation (Beauchaine, 2015). More specifically, the anterior cingulate cortex — a region of more primitive prefrontal cortex, which is strongly connected to the subcortical limbic system, a set of structures involved in emotion and motivation, including the amygdala — has been specifically linked to the cognitive control of emotions in children (Lewis & Stieben, 2004). Emotion regulation is also related to peripheral nervous system (PNS) markers of prefrontal cortex functioning, including vagal tone; an index for the functional state of the entire PNS. Suppression of vagal tone is thought to be a physiological strategy to sustain attention and behaviors that are indicative of active coping (Fox & Calkins, 2003). Empirical evidence supports this hypothesis, as more adaptive emotion regulation in difficult tasks relates to suppression of vagal tone in preschoolers (Fox & Calkins, 2003).

### *Emotion regulation: environmental influences and development across the life span*

In the first years of life, emotion regulation capacity is limited and children largely depend on the environment to help them regulate their emotions. Basic child-guided emotion regulation strategies are already observed in infancy in the form of for instance, self-soothing behavior, in which an infant attempts to decrease arousal by sucking on its hand or thumb (Thompson & Goodman, 2010). This initial stage of emotion regulation is mainly characterized by attempts to modulate arousal, and the

infant's mastery of state regulation, and control of sleep-wake cycles (Fox & Calkins, 2003).

The most important environmental source of emotion regulation for infants are parents, who manage children's emotional states by for example, comforting in case of distress, engaging in exuberant play, and organizing daily routines to create manageable emotion demands. Even when parents are not (yet) actively present, social expectations developed from experiences with parents can serve the purpose of emotion regulation; for instance, an infant already stops crying when it hears the mother's approaching footsteps. These social expectations form the basis of the parent-child relationship, as described in *attachment theory* (Cassidy, 1994): one of the most influential conceptual frameworks for understanding emotion regulation in young children. According to this theory, individual differences in emotion regulation are the result of (a child's) attachment history, and thus emotion regulation strategies are socially shaped. Empirical studies show that the interactive dynamic between a parent and an infant is not only crucial for emotion regulation processes at that particular moment, but also predicts the quality of self-controlled emotion regulation capacity in toddlerhood and preschool age (Cole et al., 2004). Children are active contributors in this parent-child dynamic and in their caregiving environment. Emotion regulation strategies or behaviors of children feed back into and influence emotion regulation-related parenting, which illustrates the reciprocal nature of parent-child interactions.

However, besides environmental influences, early emotion regulation is also influenced by the child's innate level of temperamental reactivity and regulation; some infants are more difficult to sooth than others, and some children tend to respond more impulsively than others. This innate vulnerability in reactivity and

regulation determines emotion regulation capacity in interaction with stress or support in the social environment (Crowell et al., 2015). If infants more prone to negative emotions receive less sensitive parental responses to their distress, they are more likely to develop severe regulation problems. However, a sensitive response to their distress can help them develop better emotion regulation skills (Crowell et al., 2015). The maturation of attentional control and inhibitory motor control in the first year, increases the infant's ability to become more deliberate in their efforts to manage distress, by reaching toward the caregiver for comfort, or disengaging from a distressing situation (Fox & Calkins, 2003; Thompson & Goodman, 2010).

In the toddler and preschool years, children take important steps in emotion understanding (Thompson & Goodman, 2010). Language development enables them to mentally represent emotions and communicate about emotions. This allows children not only to elicit more control over their environment, but it also permits caregivers to explain, forecast, and issue direct emotion regulation instructions (Thompson & Goodman, 2010). Cognitive progress enables children to understand that emotions are subjective, and connected to one's goals and desires. All these contribute to the complexity of emotional experiences, but also the enhancement of emotion regulation (Thompson & Goodman, 2010). Because of the child's increased knowledge and understanding of their own emotions, parents are no longer limited to merely controlling the child's emotions, but can explicitly teach them to develop emotion regulation strategies (Compas et al., 2017), for example, cognitive reframing "It's just a game", or problem-focused coping "What can you do to fix this?" (Thompson & Goodman, 2010). The realization that emotions relate to specific situations, and to perceptions, desires, and expectations, makes children aware that

emotions can pass, be changed, and be reduced by restricting their perception of the emotionally arousing events, for example, by shifting their attention (LeBlanc, Essau, & Oldendick, 2017). Toddlers and preschoolers actively use these elementary attention-based emotion regulation strategies, as is apparent from this quote of an 18-month-old: "I scared of the shark. Close my eyes." (Bretherton, Fritz, Zahn-Waxler, & Ridgeway, 1986, in Thompson, 1994).

Preschoolers expand their social network quickly, including new siblings, peers, and teachers, and thereby emotion regulation challenges increase. They must learn how to attune the intensity and duration of emotions to preserve these relationships (Cole et al., 1994). Children develop elementary internal emotion regulation skills, which make them capable of delaying gratification, adhering to social expectations, and adapting to rules at home or in the school environment (LeBlanc et al., 2017). Although the emotion regulation strategy toolbox of preschoolers is expanded, with the ability to shift attention or to reason, in novel situations they tend to fall back on adult intervention and support, or resort to more immature ways of coping, such as denial or misbehavior (Cole et al., 1994).

From middle childhood onwards, children's emotion regulation strategies become more cognitive in nature; partly as a result of the increased ability for self-reflection (Thompson & Goodman, 2010). This progress is related to the development in executive functions, which have a profound effect on the level of thinking and problem solving, as well as behavioral and emotional self-control. Children become able to reflect on, conceptualize, and verbalize their emotions in a more abstract way (Cole et al., 1994). Moreover, children learn to identify, understand, and analyze emotion-eliciting situations in terms of cause and effect, and learn alternative ways of expressing emotions (LeBlanc et al., 2017). Their

emotion regulation strategies become more psychologically informed. For instance, children use internal distraction strategies — thinking about happy things in difficult circumstances — use cognitive reframing techniques, or directly alter the physiological expression of the emotions, by using breathing techniques (Thompson & Goodman, 2010). With increasing importance and deepening of peer relationships, children’s interpersonal processes of emotion regulation start to shift from the family to a wider network of friends.

From childhood to adolescence, children become better able to tailor emotion regulation attempts to specific situations (Riediger & Klipker, 2014) and to independently manage their emotions (Compas et al., 2017). Moreover, emotion regulation strategies become more unique and personal, for instance playing your favorite song to make yourself feel better (Thompson & Goodman, 2010). However, the adolescents’ emotion regulation capacity is severely challenged, as this age period is characterized by heightened emotional reactivity due to, for instance, the hormonal changes in puberty, and increased pressures in the field of academics, employment, and social relations (Ahmed et al., 2015). This combination of an intense strain on emotion regulation, with emotional challenges explains the typical adolescent behavior, including impulsive emotional outbursts. Decreased emotion regulation capacity in adolescents has been hypothesized to be the result of an imbalance in the neural development of systems supporting emotional reactivity and regulation. The development of the prefrontal cortex — involved in emotion regulation — lags behind the development of subcortical, limbic structures, including the amygdala — involved in reactivity — which could explain why adolescents are less effective in regulating their emotions and are more affected by emotional

contexts (Ahmed et al., 2015; Riediger & Klipker, 2014). However, empirical evidence is mixed and this hypothesis thus warrants more research.

Emotion regulation development covers the whole lifespan, extending even into old age. It has been repeatedly demonstrated, across cultures, that older adults experience more positive emotions and show greater emotional stability (Sims, Hogan, & Carstensen, 2015; Turk Charles, & Carstensen, 2014), sometimes referred to as the *la dolce vita effect*. This change is probably not the result of a continuous optimization of emotion regulation as people age, but it is assumed that the antecedent-focused emotion regulation strategy of 'selection' lies at the core of this emotion regulation improvement. *Socioemotional selectivity theory* proposes that the age-related decline of resources and awareness of limited time left to live, leads people of age to adopt a more narrow focus on the most-valued domains of life (Turk Charles, & Carstensen, 2014). This narrow focus would enhance emotion regulation, as older people select situations that demand less response modulation (Sims et al., 2015). Moreover, empirical studies have demonstrated that older people tend to reappraise negative daily experiences positively, due to the adoption of a more selective attention focus on positive aspects over negative aspects, a so-called *positivity effect* or selective cognitive processing (Sims et al., 2015).

## **Conclusion**

Research into emotion regulation is a fast evolving field of psychological study, inquiring into up- and down-regulation of both positive and negative emotions. New insights in emotion regulation are continuously incorporated in existing theoretical models to fully capture the complexity of the topic. A central theoretical model on emotion regulation is the *process model*, which describes how emotions are

regulated before they are triggered (*antecedent-focused*) and how the response to these emotions are regulated (*response-focused*). This model has been complemented with the influence of external agents on emotion regulation, so-called extrinsic regulation processes. A recent extension of the process model helps clarify how emotion regulation strategies are selected and implemented.

What the focus of the field of emotion regulation ought to be is subject of many theoretical discussions, and conceptual boundaries of emotion regulation have yet to be agreed on. Some theorists regard all changes in behavior due to emotions as regulation (*emotions as regulator*), where others stress emotion regulation should entail intentionality. A lack of expression of emotion is sometimes equated with emotion regulation, as actual regulation processes are often not directly observable. However, this oversimplification could cause emotion regulation to be confused with a temperamental tendency of low arousal. Further complication arises as specific emotion regulation processes can be considered both adaptive and maladaptive, depending on context.

Emotion regulation is considered a central element of child temperament and adult personality, and emotion regulation strengths predict functioning in a variety of life domains. Emotion dysregulation is considered a vulnerability for developing psychopathology, and is central in many of its definitions. Psychological interventions aimed at emotion dysregulation are effective methods in prevention and treatment of psychopathology.

Emotion regulation is impacted by both biological and innate factors, as well as socialization influences and other environmental experiences. Technological advances are steadily helping us unravel the biological nature of emotion regulation. The environmental factors interplay with innate temperament and form different

capacities for emotion regulation throughout the various developmental stages, from infancy to adulthood.

With many difficulties yet unresolved and many technological advances still to be made, the inquiry into emotion regulation is a young and dynamic field where great strides can still be made. However, this also hampers providing a clear definition and concise summary of the field. For this reason, this chapter is painted in broad strokes with its details open to discussion. The exponential growth of empirical studies in the last decades, demonstrating how emotion regulation underlies numerous developmental outcomes and general wellbeing across the life-span, marks the relevance of further endeavoring into emotion regulation.

### **Cross-References**

appraisal theory of emotion; child temperament; cognitive theory of emotion; emotion-focused coping; emotional expressiveness; emotional intelligence; emotional intensity; emotional lability; emotional networks in the brain; inhibited and uninhibited children.

### **Acknowledgments**

The author thanks T. A. J. van Gestel for reviewing and editing an earlier version of this chapter.

### **References**

Ahmed, S. P., Bittencourt-Hewitt, A., & Sebastian, C. L. (2015). Neurocognitive bases of emotion regulation development in adolescence. *Developmental Cognitive Neuroscience, 15*, 11-25. doi: 10.1016/j.dcn.2015.07.006

- Aldao, A., Nolen-Hoeksema, S., & Schweizer, S. (2010). Emotion-regulated strategies across psychopathology: A meta-analytic review. *Clinical Psychology Review, 30*, 217-237. doi: 10.1016/j.cpr.2009.11.004
- Ayer, L., Althoff, R., Ivanova, M., Rettew, D., Waxler, E., Sulman, J., & Hudziak, J. (2009). Child behavior checklist juvenile bipolar disorder (CBCL-JBD) and CBCL posttraumatic stress problems (CBCL-PTSP) scales are measures of a single dysregulatory syndrome. *Journal of Child Psychology and Psychiatry, 50*, 1291-1300. doi: 10.1111/j.1469-7610.2009.02089.x
- Beauchaine, T. P. (2015). Future directions in emotion dysregulation and youth psychopathology. *Journal of Clinical Child & Adolescent Psychology, 44*, 875-896. doi: 10.1080/15374416.2015.1038827
- Beckes, L., & Coan, J. A. (2011). Social baseline theory: The role of social proximity in emotion and economy of action. *Social and Personality Psychology Compass, 5*, 976-988. doi: 10.1111/j.1751-9004.201.00400.x
- Bloch, L., Moran, E. K., & Kring, A. M. (2009). On the need for conceptual and definitional clarity in emotion regulation research on psychopathology. In A. M. Kring, & D. M. Sloan (Eds.), *Emotion regulation and psychopathology: A transdiagnostic approach to etiology and treatment* (pp. 88-104). New York: Guilford Press.
- Caspi, A., Houts, R. M., Belsky, D. W., Goldman-Mellor, S. J., Harrington, H., Israel, S., . . . Moffitt, T. E. (2014). The p factor: One general psychopathology factor in the structure of psychiatric disorders? *Clinical Psychological Science, 2*, 119-137. doi: 10.1177/2167702613497473
- Cassidy, J. (1994). Emotion regulation: Influences of attachment relationships. In N. A. Fox (Ed.), *The development of emotion regulation: Biological and*

- behavioral considerations*, Monographs of the Society for Research in Child Development (pp. 228-249). Chicago, Ill: University of Chicago Press.
- Cole, P. M., Martin, S. E., & Dennis, T. A. (2004). Emotion regulation as a scientific construct: Methodological challenges and directions for child development research. *Child Development, 75*, 317-333. doi: 10.1111/j.1467-8624.2004.00673.x
- Cole, P. M., Michel, M. K., & O'Donnell Teti, L. (1994). The development of emotion regulation and dysregulation: A clinical perspective. In N. A. Fox (Ed.), *The development of emotion regulation: Biological and behavioral considerations*, Monographs of the Society for Research in Child Development (pp. 73-100). Chicago, Ill: University of Chicago Press.
- Compas, B. E., Jaser, S. S., Bettis, A. H., Watson, K. H., Gruhn, M. A., Dunbar, J. P., . . . Thigpen, J. C. (2017). Coping, emotion regulation, and psychopathology in childhood and adolescence: A meta-analysis and narrative review. *Psychological Bulletin*, Advance online publication.
- Crowell, S. E., Puzia, M. E., & Yaptangco, M. (2015). The ontogeny of chronic distress: emotion dysregulation across the life span and its implications for psychological and physical health. *Current Opinion in Psychology, 3*, 91-99. doi: 10.1016/j.copsy.2015.03.023
- Eisenberg, N., Fabes, R. A., Guthrie, I. K., & Reiser, M. (2000). Dispositional emotionality and regulation: Their role in predicting quality of social functioning. *Journal of Personality and Social Psychology, 78*, 136-157. doi: 10.1037//0022-3514.78.1.136

- Eisenberg, N., & Spinrad, T. L. (2004). Emotion-related regulation: Sharpening the definition. *Child Development, 75*, 334-339. doi: 10.1111/j.1467-8624.2004.00674.x
- Fox, N. A., & Calkins, S. D. (2003). The development of self-control of emotion: Intrinsic and extrinsic influences. *Motivation and Emotion, 27*, 7-26. doi: 10.1023/A:1023622324898
- Gratz, K. L., Weiss, N. H., & Tull, M. T. (2015). Examining emotion regulation as an outcome, mechanism, or target of psychological treatments. *Current Opinion in Psychology, 3*, 85-90. doi: 10.1016/j.copsyc.2015.02.010
- Graziano, P. A., Reavis, R. D., Keane, S. P., & Calkins, S. D. (2007). The role of emotion regulation in children's early academic success. *Journal of School Psychology, 45*, 3-19. doi: 10.1016/j.jsp.2006.09.002
- Gross, J. J. (2015). Emotion regulation: Current status and future prospects. *Psychological Inquiry, 26*, 1-26. doi: 10.1080/1047840X.2014.940781
- Gross, J. J., Richards, J. M., & John, O. P. (2006). Emotion regulation in everyday life. In D. K. Snyder, J. Simpson, & J. N. Hughes (Eds.), *Emotion regulation in couples and families: Pathways to dysfunction and health* (pp.13-35). Washington, DC: American Psychological Association.
- Hawn, S. E., Overstreet, C., Stewart, K. E., & Amstadter, A. B. (2015). Recent advances in the genetics of emotion regulation: A review. *Current Opinion in Psychology, 3*, 108-116. doi: 10.1016/j.copsyc.2014.12.014
- John, O. P., & Gross, J. J. (2004). Healthy and unhealthy emotion regulation: Personality processes, individual differences, and life span development. *Journal of Personality, 72*, 1301-1334. doi: 10.1111/j.1467-6494.2004.00298.x

- Kashdan, T. B., Young, K. C., & Machell, K. A. (2015). Positive emotion regulation: addressing two myths. *Current Opinion in Psychology*, 3, 117-121. doi: 10.1016/j.copsyc.2014.12.012
- LeBlanc, S. S., Essau, C. A., & Ollendick, T. H. (2017). Emotion regulation: An introduction. In C. A. Essau, S. S. LeBlanc, & T. H. Ollendick (Eds.), *Emotion regulation and psychopathology in children and adolescents* (pp. 3-17). United Kingdom, Oxford: Oxford University Press.
- Lewis, M. D., & Stieben, J. (2004). Emotion regulation in the brain: Conceptual issues and directions for developmental research. *Child Development*, 75, 371-376. doi: 10.1111/j.1467-8624.2004.00680.x
- Lopes, P. N., Salovey, P., & Côté, S. (2005). Emotion regulation abilities and the quality of social interaction. *Emotion*, 5, 113-118. doi: 10.1037/1528-3542.5.1.113
- Riediger, M., & Klipker, K. (2014). Emotion regulation in adolescence. In J. J. Gross (Ed.), *Handbook of emotion regulation* (pp. 187-202). New York: The Guildford Press.
- Rothbart, M. K. (2007). Temperament, development, and personality. *Current Directions in Psychological Science*, 16, 207-212. doi: 10.1111/j.1467-8721.2007.00505.x
- Roemer, L., Williston, S. K., & Rollins, L. G. (2015). Mindfulness and emotion regulation. *Current Opinion in Psychology*, 3, 52-57. doi: 10.1016/j.copsyc.2015.02.006
- Sims, T., Hogan, C. L., & Carstensen, L. L. (2015). Selectivity as an emotion regulation strategy: lessons from older adults. *Current Opinion in Psychology*, 3, 80-84. doi: 10.1016/j.copsyc.2015.02.012

- Thompson, R. A. (1994). Emotion regulation: A theme in search of definition. In N. A. Fox (Ed.), *The development of emotion regulation: Biological and behavioral considerations*, Monographs of the Society for Research in Child Development (pp. 25-52). Chicago, Ill: University of Chicago Press.
- Thompson, R. A., & Goodman, M. (2010). Development of emotion regulation. More than meets the eye. In A. M. Kring, & D. M. Sloan (Eds.), *Emotion regulation and psychopathology: A transdiagnostic approach to etiology and treatment* (pp. 38-58). New York: The Guilford Press.
- Turk Charles, S., & Carstensen, L. L. (2014). Emotion regulation and aging. In J. J. Gross (Ed.), *Handbook of emotion regulation* (pp. 203-218). New York: The Guilford Press.