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Emotion-Related Self-Regulation in Children

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Abstract

In this article, the authors review basic conceptual issues in research on children's emotion-related self-regulation, including the differentiation between self-regulation that is effortful and voluntary and control-related processes that are less amenable to effortful control. In addition, the authors summarize what researchers know about developmental changes in self-regulatory capacities, give examples of various methods used to assess these abilities, and summarize findings on the relations between self-regulation or effortful control and positive adjustment and maladjustment. Finally, the authors discuss some strategies for effectively teaching students about emotion regulation.

Keywords

self-regulation; effortful control; emotion

Developmental psychologists study change in most processes of interest to psychologists, including processes involved in social, emotional, perceptual, and cognitive systems. For decades, behavioral and social-learning approaches to understanding socioemotional development dominated the field. Until the 1980s, developmental psychologists did not focus much on emotion and emotion regulation. By the 1990s, however, the study of emotion and its regulation had become quite popular, and today it is common to find articles on emotion regulation in developmental psychology journals. In particular, many investigators have been interested in how people regulate their emotion and behavior related to emotion—what Eisenberg and Spinrad (2004) labeled emotion-related self-regulation.

Controversies About the Definition and Purview of Emotion Regulation

Eisenberg, Hofer, and Vaughan (2007) defined emotion-related regulation as "processes used to manage and change if, when, and how (e.g., how intensely) one experiences emotions and emotion-related motivational and physiological states, as well as how emotions are expressed behaviorally" (p. 288). Investigators, however, differ in regard to what processes they include in emotion regulation. For example, there is disagreement regarding whether the same term should include both extrinsic processes (e.g., parents' helping children to manage their emotions; see Cole, Martin, & Dennis, 2004; Thompson, 1994) and intrinsic processes (e.g., attention, inhibition, cognitions; Eisenberg & Spinrad, 2004) that modulate emotions and emotion-related behavior. Clearly, modulation from both external and internal sources is important for children's experience of emotion and related

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behavior. Nonetheless, Eisenberg and Spinrad (2004) argued that it is useful to differentiate between regulation that comes from outside the self and self-regulation that involves intrinsic processes. It is difficult to differentiate emotion from its regulation (Cole et al., 2004), and researchers differ in the degree to which they are willing to use levels of emotion displayed by individuals as indices of emotion regulation. Some investigators consider, for example, parents' reports of their children displaying low levels of anger as indicative of being well regulated; others would say that the child who is low in anger simply may not feel the emotion much.

Because of the difficulty differentiating emotion from its regulation, investigators often find it useful to focus on the processes involved in emotion regulation rather than on the amount of emotion experienced or expressed. Some capacities involved in emotion-related regulation appear to have a temperamental basis. Rothbart and Bates (2006) labeled temperamental self-regulatory capacities as effortful control, defined as "the efficiency of executive attention—including the ability to inhibit a dominant response and/or to activate a subdominant response, to plan, and to detect errors" (p. 129). Effortful control includes the abilities to shift and focus attention as needed, to inhibit behavior when needed (i.e., inhibitory control), to activate or perform an action when there is a tendency to avoid it (i.e., activation control; Evans & Rothbart, 2007; Rothbart, Ahadi, Hershey, & Fisher, 2001), and some executive functioning skills involved in integrating information and planning.

People who are able to regulate their emotional reactivity in social or nonsocial contexts deal well with stressful events. For instance, shifting attention away from a distressing stimulus (e.g., a horror film) or a tempting object can decrease arousal. Focusing attention on positive aspects of the situation or on other means of coping also can decrease negative emotion. Moreover, focusing attention on nonthreatening ideas or objects can be a distraction from a distressing event or cognition. Consider Mischel's (1974) classic delay-of-gratification studies, in which he videotaped children who could choose a smaller treat that was right in front of them or wait for an experimenter to bring back a larger treat. Mischel found that some children tried to distract themselves by talking or singing. Others kept their attention on the rewards. The children who shifted their attention away from the treat were better able to delay gratification than the children who attended to the treat. Presumably, this self-distraction lessened children's desire for attractive items, which enhanced their ability to delay gratification. Similarly, the abilities to shift and refocus attention have been associated with lower levels of distress, frustration, and other negative emotions (Bridges & Grolnick, 1995; Derryberry & Rothbart, 1988; Eisenberg et al., 1993; Rothbart, Ziaie, & O'Boyle, 1992).

Many processes involved in the modulation of emotion are typically automatic and may be difficult to control consciously. Thus, some researchers have viewed emotion regulation as spanning a continuum from conscious, effortful, and controlled regulation to unconscious, effortless, and automatic regulation (Gross & Thompson, 2007). Although automatic, unconscious, or uncontrolled responding to emotion-relevant stimuli or cognitions may be more reliable and effective than conscious responses (Bargh & Williams, 2007), Eisenberg and colleagues (e.g., Eisenberg et al., 2004), like some coping theorists (Compas, Connor, Saltzman, Thomsen, & Wadsworth, 2001), have argued that it is useful to differentiate willful or effortful forms of self-control from those aspects of control that are less amenable to willful control. Eisenberg et al. (2004) thus suggested a distinction between effortful control and reactive control.

The primary distinction between these constructs is that effortful control, although often automatic, can be subject to conscious control. For example, people often drive their cars in a fairly automatic mode. But when they need to be conscious and careful about their driving

because of bad weather, bad drivers, or some other factor, they can switch into a very conscious and willful mode of action. The same is likely true with many processes used to regulate attention, behavior, and emotion. In contrast, reactive control refers to relatively involuntary motivational approach or avoidance systems of response reactivity that, at the extremes, reflect impulsive undercontrol or rigid overcontrol (e.g., Eisenberg et al., 2004; Eisenberg & Morris, 2002; also see Carver's, 2005, discussion of impulse vs. constraint). Consistent with the distinction between effortful and reactive control, the two constructs can be differentiated empirically (e.g., Eisenberg et al., 2004; Valiente et al., 2003). There is ongoing debate in the field, however, about how to parse out and label these various control processes.

Development of Self-Regulation and Temperamentally Based Effortful Control

For a long time, developmental psychologists assumed that young children had little capacity for self-regulation. Yet researchers are increasingly identifying early indicators of rudimentary self-regulation or precursors of effortful control and have found evidence that self-regulatory processes continue to develop through adolescence.

Early in life, caregivers help infants to regulate their emotion by modulating their exposure to stimulating events and by acting to alleviate infants' distress, frustration, or fear with techniques such as soothing or distraction. But the ability to regulate one's own behavior develops rapidly in the toddler and preschool years (Kopp, 1982; Kopp & Neufeld, 2003; Rothbart & Bates, 2006), and infants and preschoolers improve in aspects of executive functioning that are part of, or related to, effortful control (see Garon, Bryson, & Smith, 2008). For example, infants demonstrate the capacity to sustain attention by 8 to 10 months of age (Kochanska, Coy, Tjebkes, & Husarek, 1998), and between 9 and 18 months of age, attention becomes more voluntary (Ruff & Rothbart, 1996). Moreover, on a Stroop-like task that required toddlers to switch attention and inhibit behavior, Posner and Rothbart (1998) found improvement in performance by 30 months and high levels of accuracy by 36 to 38 months.

The ability to inhibit behavior when a child does not want to do so (inhibitory control) is typically absent until 24 to 36 months of age (Gerardi-Caulton, 2000). Kochanska, Murray, and Harlan (2000) found significant performance gains on tasks involving inhibitory control between 22 to 33 months of age. Other researchers have shown that the ability to inhibit behavior on tasks similar to "Simon says" (when children must inhibit behavior in response to one command or cue and activate behavior in response to another) improves between 3 and 4 years (Jones, Rothbart, & Posner, 2003; Posner & Rothbart, 1998; Reed, Pien, & Rothbart, 1984). Increases in the length of time children can wait for a treat are also evident from 24 months to 4 years (Carlson, 2005; Kochanska et al., 2000; Li-Grining, 2007).

There are further improvements in effortful control and executive functioning in the late preschool and early school years. For example, Diamond and colleagues (Diamond, Prevor, Callender, & Druin, 1997; also see Diamond & Taylor, 1996) found improvement in children's responses to the day– night task between 3.5 and 7 years; on this task, children say "day" when the adult holds up a black card with stars and "night" when the adult holds up a white card with a bright sun. Carlson (2005) also found an increase in performance between 3 and 5 years for the majority of 17 executive functioning tasks (also see Mezzacappa, 2004). Effortful control continues to improve during the school years and, at a slower pace, into adulthood (Crone, Somsen, Zanolie, & van der Molen, 2006; Leon-Carrion, García-Orza, & Pérez-Santamaría, 2004; Murphy, Eisenberg, Fabes, Shepard, & Guthrie, 1999; Williams, Ponesse, Schachar, Logan, & Tannock, 1999).

Measurement of Emotion-Related Self-Regulation, Including Effortful Control

The study of emotion-related self-regulation in childhood has been characterized by multireporter, multimethod approaches. Attention tomeasurement issues can help students understand the nature of the skills involved in emotion-related self-regulation.

A variety of excellent questionnaires are available to measure effortful control and emotion regulation (Gartstein & Rothbart, 2003; Putnam, Gartstein, & Rothbart, 2006; Shields & Cicchetti, 2001; Windle & Lerner, 1986). For example, the Child Behavior Questionnaire (Rothbart et al., 2001) assesses multiple aspects of effortful control, including attention focusing (e.g., “When drawing or coloring in a book, shows strong concentration”) and inhibitory control (e.g., “Can lower his/her voice when asked to do so”). In addition, researchers have used a variety of behavioral measures that assess effortful control and some aspects of executive functioning involved in emotion-related self-regulation. Tasks include the day–night executive functioning task, which we discussed earlier (see Garon et al., 2008), and Kochanska et al.’s (2000) comprehensive battery of tasks designed to measure five components of effortful control: delaying, slowing down motor activity, suppressing or initiating activity to signal, lowering one’s voice, and effortful attention. For example, children may have to wait to take an attractive snack until a bell rings; they might also play a Simon-says-type task, in which they must inhibit or activate behaviors based on different verbal commands (Kochanska, Aksan, Prisco, & Adams, 2008).

An emerging trend is to measure self-regulatory processes with physiological measures. Although psychophysiological variables provide a different perspective on regulation than other methods, it is not yet clear the extent to which psychophysiological responses tap processes involved in emotion regulation. For instance, physiological responses often appear to tap some combination of reactivity and regulation. Further complicating this issue, there are a number of ways people can regulate emotions (Gross, 1998), including cognitive strategies (e.g., distraction) and response modulation (e.g., trying to control behavioral responses), and they may differ in which physiological responses are associated with them. Here we focus on parasympathetic nervous system (PNS) function as an example of how researchers can use psychophysiological data to understand emotional reactivity and its regulation and to illustrate the complexity of the findings.

The sympathetic nervous system (SNS) and PNS jointly enervate many of the body’s organs and have opposing effects. For example, SNS activity increases heart rate, whereas the PNS decreases heart rate. When faced with a stressful situation, SNS activity increases and PNS activity decreases, resulting in rapid physiological changes that are collectively known as the fight–flight response. PNS influence on the heart waxes and wanes with respiration, decreasing during inspiration and increasing during expiration. This results in a rhythmic pattern of rising and falling heart rate called respiratory sinus arrhythmia (RSA) that is sometimes also referred to as vagal tone because the vagus nerve primarily mediates PNS influence on the heart (Porges, 2007). Students can verify the presence of this pattern of accelerating and decelerating heart rate by taking their pulse while breathing slowly.

RSA measured under resting (baseline) conditions seems to reflect dispositional levels of PNS activity (El-Sheikh, 2005). Researchers have also examined RSA changes in response to a stimulus or task. Sustaining attention and responding to stress typically elicit a decrease in RSA from baseline; this decrease is referred to as RSA suppression.

Because low baseline RSA is associated with fight–flight behavior, high RSA may reflect self-regulation. Some studies have found a positive relation between baseline RSA and

attention regulation (Hansen, Johnsen, & Thayer, 2003; Suess, Porges, & Plude, 1994). In contrast to baseline RSA, some have conceptualized RSA suppression as an index of the ability to engage with the environment. As such, the inability to suppress RSA in response to situations that demand attention may indicate self-regulatory problems (Porges, Doussard-Roosevelt, Portales, & Greenspan, 1996). Infants who sustain attention to a stimulus show greater RSA suppression (Richards, 1985). Infants and childrenwith highRSAsuppression are also rated by theirmothers as having higher attention (Huffman et al., 1998; Richards, 1987) and emotion regulation (Gottman, Katz, & Hooven, 1996). Children with greater RSA suppression to cognitively and emotionally challenging tasks have higher status with peers (Graziano, Keane, & Calkins, 2007). Moreover, high RSA suppression has been associated with lower levels of externalizing problems (Boyce et al., 2001; Calkins, Graziano, & Keane, 2007), although the findings are not consistent and may change with age (Beauchaine, Gatzke-Kopp, & Mead, 2007).

These studies suggest that RSA suppression indexes the capacity for self-regulation. But perseverative cognitions (i.e., rumination) that reflect excessive worry about stressors may indicate a risk for anxiety (Brosschot, Gerin, & Thayer, 2006), and worry about stressors is associated with suppression of RSA (Brosschot, Van Dijk, & Thayer, 2007). Moreover, high RSA suppression has been associated with elevated internalizing problems (Calkins et al., 2007). The context in which researchers measure RSA suppression may play an important role in whether it reflects the adaptive ability to regulate attention as needed to engage with the environment or the inability to disengage one's attention and cognition from stressful circumstances.

The Relation of Emotion-Relevant Regulation to Quality of Social Functioning

There is a rapidly accumulating body of literature indicating that individual differences in the regulation of emotion and behavior driven by emotion are linked to variations in social competence and maladjustment. For example, there is strong evidence that individual differences in self-regulation are negatively associated with externalizing problems (e.g., aggression, defiance; Kochanska & Knaack, 2003; Rothbart & Bates, 2006) and also predict change in externalizing problems over time (Eisenberg et al., 2004). In addition, effortful control may be a stronger predictor of externalizing problems for children prone to experience negative emotions (Eisenberg, Guthrie, et al., 2000; see Eisenberg, Spinrad, & Eggum, 2010). Furthermore, although the data are mixed, there is also evidence that some aspects of emotion-related regulation and/or effortful control—especially skills involving effortful attention—are associated with low levels of internalizing problems (see Eisenberg, Spinrad, et al., 2010). Individual differences in emotion-relevant regulation also have been associated with social competence, conscience, sympathy, and prosocial behavior (Eisenberg et al., 1993; Eisenberg, Fabes, Karbon, et al., 1996; Kochanska & Knaack, 2003; Rydell, Berlin, & Bohlin, 2003; Spinrad et al., 2006; Spinrad et al., 2007; also see Eisenberg, Eggum, Sallquist,& Edwards, 2010). Again, such relations may be stronger for children prone to negative emotions (Eisenberg, Fabes, Guthrie,& Reiser, 2000; Eisenberg, Fabes, Murphy, et al., 1996). In general, measures of self-regulation, including effortful control, have been consistently related to better adjustment and less maladjustment in childhood and adolescence. Associations such as these ensure that the current interest in emotion-related self-regulatory processes will not abate quickly.

How to Teach About Emotion Regulation

We suggest that teachers help students understand the nature of emotion-related self-regulation by having students try simple questionnaire and behavioral measures on

themselves, friends, or family members. Students can discuss what processes are being regulated in each task and how that type of regulation might affect feelings and their expression and/or social behavior. Information on Kochanska's tasks (e.g., Kochanska et al., 2000; Kochanska et al., 2008) can be obtained from her at Grazyna-kochanska@uiowa.edu. Rothbart and colleagues' questionnaires (e.g., Rothbart et al., 2001) are available from Samuel Putnam at http://www.bowdoin.edu/~sputnam/rothbart-temperament-questionnaires/request-forms/.

Typical self-regulation tasks tap skills associated with executive attention (e.g., the ability to shift and focus attention), inhibiting behavior, delaying gratification (as described above), and modulating the expression of emotion. Attention regulation can be measured using tasks such as the Continuous Performance Task (CPT), which is computerized. The CPT presents a number of images to the participant, who then presses a key when a particular image appears on the screen. Interested persons can obtain an example of a CPT program by emailing the first author at Nancy.Eisenberg@asu.edu. As another example, the Attention Network Test (ANT; Fan, McCandless, Sommer, Raz, & Posner, 2002) tests three aspects of attention: orienting, alerting, and executive function. The ANT computer programis available at http://www.sacklerinstitute.org/ users/jin.fan/.

Examples of measures of inhibitory control include games similar to Simon says (Kochanska et al., 2008) as well as executive function tests such as the knock–tap task (Luria, 1966), in which participants first imitate the experimenter's actions (knocking on a table with a closed fist when the experimenter knocks and tapping with an open palm when the experimenter taps) and then perform tricky trials (knocking when the experimenter taps and tapping when the experimenter knocks). Stroop tasks, such as the day–night task (Diamond & Taylor, 1996), are also measures of inhibitory control.

Delay tasks measure a child's ability to inhibit responding in the face of temptation. One example is Mischel's "marshmallow" delay-of-gratification task (e.g., Mischel, Ebbesen, & Zeiss, 1972), which we mentioned earlier and for which clips are widely available online, but there are numerous adaptations. For instance, in the gift-wrap task (Kochanska et al., 2000), the experimenter noisily wraps a gift for 2 minutes behind a child, who is asked not to peek.

Persistence tasks measure activational control, which is the ability to persist at a difficult or unpleasant task. Examples of this kind of task include persisting at a nearly impossible, frustrating task (e.g., Eisenberg, Fabes, Guthrie, et al., 1996) and persisting on unsolvable puzzles (e.g., Baumeister, Bratslavsky, Muraven, & Tice, 1998).

Summary

In summary, self-regulation skills are basic skills that develop from the early years into adulthood. They predict numerous aspects of social competence and maladjustment. Thus, self-regulation is an important construct for understanding processes that contribute to both normative development and individual differences in diverse aspects of functioning.

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