Canadian Psychology / Psychologie canadienne
2017, Vol. 58, No. 3, 276–287

0708-5591/17/$12.00 http://dx.doi.org/10.1037/cap0000119

The Regulation of Achievements Emotions: Implications for Research and Practice

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This article offers a critical review of several influential emotion theories and emotion regulation models in terms of their utility for explaining how, when, and why students regulate their achievement emotions. Based on this review, we propose a novel framework for the regulation of achievement emotions. This framework is based on the premise that student learning and achievement is influenced by both achievement emotions and efforts to regulate these emotions. The framework further proposes that emotion regulation decisions, namely, the identification, selection, and implementation of regulatory strategies, are shaped by 5 antecedent factors: emotion-outcome expectancies, motives for emotion regulation, implicit beliefs about emotions, emotion regulation self-efficacy, and emotion regulation aptitude. The theoretical and practical implications of this framework are discussed.

Keywords: achievement emotions, emotion, emotion regulation, learning, academic achievement

In educational contexts, students experience a range of emotions, which can occur in response to a variety of stimuli, such as achievement outcomes (Pekrun & Linnenbrink-Garcia, 2014). These emotions are referred to as achievement emotions because "they are tied to achievement activities or achievement outcomes" (Pekrun, 2006, p. 317). Achievement emotions are important because they mediate effective learning by influencing the correlates of achievement, including cognitive, motivational, and behavioral factors (Pekrun, 2006; Pekrun & Perry, 2014). For example, positive activating emotions, such as enjoyment, preserve cognitive resources, direct attention toward the achievement task, and promote motivation and deep learning (e.g., Meinhardt & Pekrun, 2003; Pekrun, Goetz, Titz, & Perry, 2002). As such, these emotions relate positively to learning and achievement (e.g., Ahmed, van der Werf, Kuyper, & Minnaert, 2013; Burić & Sorić, 2012; Villavicencio & Bernardo, 2013). On the other hand, negative activating emotions, such as anxiety, are expected to reduce cognitive resources, direct attention away from the task, reduce motivation, and lead to more surface learning (e.g., Pekrun et al., 2002; Turner & Schallert, 2001). As a consequence, negative activating emotions are related negatively to learning and achievement (e.g., Burić & Sorić, 2012; Dettmers et al., 2011; Hembree, 1998; Zeidner, 1998). This growing body of work has highlighted the need for fostering adaptive achievement emotions to promote learning and achievement. However, *how* adaptive achievement emotions can be supported remains an underexplored area of research (Pekrun & Perry, 2014). Emotion regulation is one possible mechanism to support adaptive achievement emotions.

Control over one's emotions was initially examined in the form of coping with stressful events and focused on the control of negative affect (Lazarus & Folkman, 1984). More recently, research has examined emotion regulation, which is the ability to modify the occurrence, intensity, and duration of positive and negative emotion (Gross, 1998). In clinical, personality, and developmental psychology, emotion regulation has witnessed an increase in empirical research, which has linked emotion regulation to various outcomes, including psychological and emotional adjustment (e.g., Berking, Orth, Wupperman, Meier, & Caspar, 2008; Silk, Steinberg, & Morris, 2003), mental health (e.g., Berking & Wupperman, 2012; Gross & Muñoz, 1995), and well-being (e.g., Gross & John, 2003). More recent investigations, however, have revealed that the causes and consequences of emotion regulation are more nuanced than earlier research suggested. For example, the implementation of specific emotion regulation strategies has shown various patterns of adaptiveness and effectiveness (for reviews, see Aldao, Nolen-Hoeksema, & Scheiwzer, 2010; Webb, Miles, & Sheeran, 2012). In addition, it now appears that context is of particular importance for emotion regulation decisions and consequences (e.g., Aldao, 2013; Gross, 2015; Troy, Schallcross, & Mauss, 2013). Accordingly, findings from the broader psychological literature might not necessarily generalize to educational settings or specific contexts within these settings. This raises many foundational questions for research and practice in education, including the following: (a) Which emotions should be regulated? (b) When should emotions be regulated? (c) How should emotions be regulated? and (d) What are the consequences of emotion regulation? Addressing these questions is critical because student emotions are not only central to learning and achievement but also for student well-being and retention (Pekrun & Perry, 2014).

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In this article, we review the conceptualization, process, and consequences of regulating achievement emotions. In the next section, we review theories of emotion and models of emotion regulation by drawing on related fields of psychology, as well as educational psychology. Specifically, we review appraisal theories of emotion and three influential models of emotion regulation, namely, the extended process model of emotion regulation (EPM; Gross, 2015), the control-value theory of achievement emotions (CVT; Pekrun & Perry, 2014), and the performance-approach and regulation of emotion model (PARE; Tyson, 2008; Tyson, Linnenbrink-Garcia, & Hill, 2009). An earlier version of the first framework, the EPM (Gross, 1998), is the most widely cited emotion regulation framework to date (Webb, Gallo, Miles, Gollwitzer, & Sheeran, 2012) and comprehensively describes emotion regulation in general contexts. The latter two frameworks offer a situated perspective on aspects of the regulation of achievement emotions. We evaluate these emotion theories and emotion regulation models based on their utility for examining the regulation of achievement emotions within achievement contexts. Based our critical review, we conclude by proposing a framework for the regulation of achievement emotions. This framework integrates and expands upon many of the components discussed in the three emotion regulation models, with the goal of providing a comprehensive framework to inform future educational research and practice.

Theories of Emotion

Conceptions of achievement emotions are not tied to a specific emotion theory; therefore, different perspectives on emotions can guide our understanding of the regulation of achievement emotions. This is because perspectives on emotion directly shape the conceptualization of emotion regulation (Gross & Barrett, 2011). In other words, views on what an emotion *is* determines perspectives on *how* emotions can be regulated. Thus, establishing the boundary between emotions and other affective and cognitive states is necessary when attempting to identify what is to be regulated during emotion regulation (Gross & Barrett, 2011). Because achievement emotions are a specific type of emotion, these perspectives lend themselves to our understanding of achievement emotions and the regulation of these emotions. Specifically, achievement emotions are defined as, "affective arousal that is tied directly to achievement activities (e.g., studying) or achievement outcomes (success and failure) [. . .] Emotions directly pertaining to the activities performed in academic settings can also be considered as achievement emotions" (Pekrun & Perry, 2014, pp. 121–122). Thus, achievement emotions are defined by the same characteristics common to all emotions, and these characteristics are discussed in several dominant theories of emotion, including affect program theories (e.g., Ekman, 1992; Izard, 1977; Thomkins, 1962), appraisal theories (e.g., Arnold, 1960; Frijda, 1986; Lazarus, 1966; Scherer, 1984), and psychological construction theories (e.g., Barrett, 2006, 2014; Russell, 2003). Generally, these theories agree that emotions are caused by a specific stimulus, consist of multiple components, and are processes that unfold over time. It is also generally agreed that emotions are distinct from other affective phenomena, including moods and stress responses. Despite this consensus, there are also subtle yet important differences between these perspectives. In the following sections, we will discuss the characteristics of emotions, while providing examples of how these characteristics apply to achievement emotions more specifically.

Emotions Are Caused by a Stimulus

Affect program theories, appraisal theories, and psychological construction theories agree that emotions are caused by a stimulus. In other words, an emotion is about something (Shuman & Scherer, 2014). In achievement contexts, these emotions can be about a future, current, or previous achievement activity or achievement outcome (Pekrun, 2006; Pekrun & Perry, 2014). However, the specifics regarding which stimuli causes an emotion, of what valence (positive or negative), and of what intensity varies between theories of emotion. Moors (2009) referred to these issues of emotion causation as the "differentiation problem," "quality problem," and "quantity problem," respectively.

Affect program theories consider emotions as evolved processes intended to serve a particular adaptive function important for survival (Plutchik, 2001). The function of an emotion is to "create an interaction between the individual and the event or stimulus that precipitated the emotion" (Plutchik, 2001, p. 346). These emotions are considered basic because they have "evolutionarily old neurobiological substrates as well as an evolved feeling component and capacity for expressive and other behavioral actions of evolutionary origin" (Izard, 2007, p. 261). According to traditional affect program theorists, organisms respond to a specific type of external situation (e.g., threat) with a prototypical emotional response (e.g., fear). Thus, all situations that fit a particular archetype will elicit the same basic emotion response. For example, a student might perceive a final exam as a threat and because this stimulus has activated an evolved pathway, the student may consequently feel fear. Traditional affect program theorists believe that basic emotions are elicited in the absence of higher cognitive functioning (Ekman, 2003; Izard, 1977), while more contemporary variants of affect program theories accept that some basic-level cognitive processing and rudimentary appraisals may be involved (Izard, 2007; Plutchik, 2001). The number of basic emotions varies between theorists but can range from 3 to 11 (Plutchik, 2001), and some theorists claim that more complex emotions can be derived from basic emotions (e.g., Johnson-Laird & Oatley, 1989; Plutchik, 1980).

In appraisal theories of emotion, appraisals are considered antecedents to all emotional episodes. The elicitation of a specific emotion is thought to be caused by how the stimulus is evaluated. Unlike in affect program theories, it is assumed that individuals experience emotions by evaluating external or internal stimuli (e.g., memory). Most appraisal theorists agree that individuals evaluate a stimulus according to appraisals of goal relevance, goal congruence, expectancy, agency, and control (Moors, 2014; Moors, Ellsworth, Scherer, & Frijda, 2013). These different appraisal processes are thought to account for why different people experience different emotions in response to the same stimuli (Siemer, Mauss, & Gross, 2007). For example, while one student might appraise a final exam as a threat and feel fear, another student might appraise the same exam as a challenge and feel excited or hopeful. The exact list of appraisals, how they link to emotional episodes, whether they are processed in serial or in parallel, and whether appraisals are discreet or continuous are

some points of contention amongst appraisal theorists (Moors et al., 2013; Scherer, 2009).

Psychological construction theories of emotion (e.g., Barrett, 2006, 2014; Russell, 2003) consider emotions as categorizations of core affect. Core affect is a state that is consciously accessible as a feeling that is a blend of valence (i.e., pleasure or displeasure) and arousal (i.e., relaxed or activated; Russell, 2003). As in contemporary affect program theories and appraisal theories, an emotion is caused by an evaluation of the situation. It is thought that discrete emotion labels are individually constructed based on a combination of situation appraisals and physiological input. The construction process is influenced by an individual's conceptual knowledge about emotion, which is culturally determined (Russell, 2003). In other words, the association of a particular set of emotion components with the emotion "anger" is determined by learned emotion scripts embedded in the social context.

Emotions Consists of Multiple Components

It is also generally agreed that emotions consist of multiple components, including a feeling, appraisal, motor, physiological, and action tendency component (Moors, 2009; Scherer, 2005; Shuman & Scherer, 2014). Each of these components is also thought to serve a specific function. The feeling component involves the subjective experience of an emotion and is believed to be primarily associated with monitoring and individual–environment interaction. The monitoring function allows individuals to be aware of their emotions, which is a key aspect of volitional emotion regulation (Shuman & Scherer, 2014). This awareness function enables students to differentiate between feeling excited or anxious, which has the potential to influence regulatory decisions. The appraisal component is associated with evaluating the stimulus. This allows the individual to determine whether the stimulus is personally relevant and to understand the causes and consequences of an event. Relevance is established based on assessments of how the object or event relates to individual needs or goals. For example, if a student views a test as having no personal relevance, then it is unlikely that they will feel any strong emotions in relation to the test, while another student who evaluates the test as important will most likely feel some emotion in response to the test. However, which emotion a student will experience also depends on the appraisals pertaining to the causes and consequences of the stimuli.[1] The action tendency component is involved in the prioritization and preparation of action and the direction of the action. In other words, emotions motivate particular behaviors over other behaviors and can be associated with approach or avoidance action tendencies. For example, a student who feels anxious about an upcoming test might be motivated to study (i.e., an approach action tendency) to reduce their feelings of anxiety, while another student might not study altogether (i.e., an avoidance action tendency). The motor component is involved in communicating reactions and behavioral intentions to others. Finally, the physiological component involves changes in the body to support the activity of the other components.

The order in which these components are activated varies as a function of the emotion theory (Moors, 2009; Shuman & Scherer, 2014). In affect program theories, it is believed that all components are simultaneously activated as a single package (Plutchik, 2001). In appraisal theories, appraisals are triggered prior to the other components and the feeling component is triggered after the motivational, physiological, and motor components (Moors, 2009). In psychological construction theories, not all components need to be activated for the construction of an emotion (Shuman & Scherer, 2014).

Emotions Are Processes

It is also generally agreed that emotions are processes that unfold over time (Cunningham & Zelazo, 2007; Moors, 2009; Scherer, 2005). The entire emotional episode begins with the stimulus and consists of the components and consequences of an emotion (Moors, 2009). An emotion episode is short-lived and lasts between seconds to minutes (Shuman & Scherer, 2014). However, what components are activated and at which point during an emotional episode differs between emotion theories. In traditional affect program theories of emotion, the emotional episode begins with a baseline, where the individual is in a nonemotional state. After perceiving the stimulus, an emotion is evoked and finally, the individual returns to baseline (Plutchik, 2001). In more contemporary affect program theories, this sequence also includes appraisals following the situation (Plutchik, 2001). Implicit in this appraisal process is attention to and evaluation of the stimuli. In appraisal theories of emotion, emotion generation unfolds in the sequence of situation, attention, appraisal, and response. This progression is described by the modal model of emotion generation (Gross & Thompson, 2007). In psychological construction theories, the individual is always experiencing core affect; however, the stimuli dramatically alters core affect and core affect continues to changes as the emotional episode unfolds (Russell, 2003).

Emotions Are Not Moods or Stress Responses

In addition to general agreements on what an emotion is, there is also consensus on what an emotion is not. While an emotion is regarded as a subtype of affective phenomena, emotions can be clearly distinguished from moods (Scherer, 2005; Shuman & Scherer, 2014) and stress responses (Gross, 2015). Emotions are delineated from these other affective phenomena because the latter are not necessarily about something, do not consist of the same components as emotion, and do not unfold over a similar period of time. Specifically, moods are not emotions because moods lack an event focus and persist over long periods of time, lasting from days to weeks (Scherer, 2005). Stress is also not an emotion because stress responses are considered to be unspecified negative states that are evoked specifically when an individual evaluates the demands of a situation as unmanageable (Lazarus & Folkman, 1984). While moods and stress responses are relevant to learning and achievement outcomes, the focus of this article is on emotion and the processes involved in regulating emotion.

Implications for Emotion Regulation in Achievement Contexts

As broadly defined at the beginning of this section, emotion regulation involves influencing how an emotion unfolds over time in

[1] The control value theory of achievement emotions (Pekrun, 2006; Pekrun & Perry, 2014), which proposes that appraisals of control and value are proximal determinants of student achievement emotions, is discussed in detail in our review of emotion regulation frameworks.

terms of intensity, duration, and quality (Gross, 1998). Given that emotion regulation is not tied to a single emotion theory, it has been argued that different perspectives on emotion regulation are a function of the underlying emotion theory (Gross & Barrett, 2011).

One point of divergence between different theorists is the conceptual boundary between emotion generation and emotion regulation. Some would assert that emotion generation and emotion regulation are not separate processes (e.g., Kappas, 2011), while others would argue that these processes are not ontologically distinct but should be conceptually and analytically differentiated (e.g., Campos, Frankel, & Camras, 2004). All the emotion theories reviewed in this paper adhere to a third perspective, which considers emotion generation and emotion regulation as separate processes.

The targets of emotion regulation can include, to varying degrees, the stimulus, attention, appraisal, motor responses, and physiological responses. In traditional affect program theories, emotion generation and emotion regulation are considered separate processes operated by biologically distinct systems (Gross & Barrett, 2011). According to this view, an emotion can be regulated by changing the situation, action tendencies, or by suppressing the motor and physiological responses (Shuman & Scherer, 2014). In contemporary affect programs theories, appraisal processes might also be targets for regulation (Izard, 2007). In appraisal theories, emotion generation and emotion regulation are thought to have overlapping cortical systems but are still regarded as separate processes (Gross & Barrett, 2011). In this view, emotions can be regulated at several points during the emotion generation process by targeting the situation, attention, appraisal, or physiological and motor responses (Gross & Thompson, 2007). In psychological construction theories, the distinction between emotion generation and emotion regulation is less clear because emotional experiences are continuously constructed (Gross & Barrett, 2011). In line with this view, emotion regulation might occur by targeting the situation or the emotion construction process, which includes appraisals, behavioral, and physiological responses (Moors, 2009; Russell, 2003; Shuman & Scherer, 2014).

Affect program theories, appraisal theories, and psychological construction theories each provide a unique lens through which the generation and regulation of achievement emotions can be considered. Given that the conceptions of achievement emotions are not tied to a specific emotion theory, these different perspectives can guide research on the regulation of achievement emotions. In the following section, we elaborate on the conceptualizations of emotion regulation, including coping, and review three frameworks that address when, why and how emotions are regulated. The first framework, the EPM (Gross, 2015), is an extension of the most widely cited emotion regulation framework (Webb, Gallo, et al., 2012) and offers a detailed explanation of emotion regulation processes for emotions in general. The second two frameworks, the CVT (Pekrun & Perry, 2014) and the PARE model (Tyson, 2008; Tyson, Linnenbrink-Garcia, & Hill, 2009), are situated in achievement contexts and provide insights into the regulation of achievement emotions.

Conceptualizing the Regulation of Achievement Emotions

There remains disagreement amongst contemporary theorists regarding the differentiation between coping and emotion regulation. While coping has been traditionally associated with managing personal resources in stressful situations (Lazarus & Folkman, 1984), it has more recently been defined as, "conscious and volitional efforts to regulate emotion, cognition, behavior, physiology, and the environment in response to stressful events or circumstances" (Compas et al., 2011). Whereas emotion regulation has been defined as, "the process by which individuals influence which emotions they have when they have them, and how they experience these emotions" (Gross, 2013, p. 275). From these definitions, it is apparent that the boundaries between coping and emotion regulation are woefully ambiguous.

There are several competing perspectives concerning the distinctions between coping and emotion regulation, which are relevant for the conceptualization of regulating achievement emotions. One perspective is that coping is a special case of emotion regulation (e.g., Eisenberg, Spinrad, & Eggum, 2010), a second perspective is that emotion regulation is a form of coping (e.g., Skinner & Zimmer-Gembeck, 2007), while yet a third perspective is that emotion regulation and coping are closely linked but distinct processes (e.g., Compas et al., 2014; Gross, 2015). This discord is echoed in the educational psychology literature, where coping and emotion regulation are sometimes considered unique processes (e.g., Jacobs & Gross, 2014; Pekrun & Stephens, 2009), while at other times are discussed interchangeably (e.g., Boekaerts, 2002; Schutz, Davis, DeCuir-Gunby, & Tillman, 2014). To clarify these positions, we will discuss the differences and similarities between coping and emotion regulation as well as their utility for conceptualizing the regulation of achievement emotions.

Traditionally, coping has been defined as, "constantly changing cognitive and behavioral efforts to manage specific external and/or internal demands that are appraised as taxing or exceeding the resources of the person" (Lazarus & Folkman, 1984, p. 141). As mentioned previously, more recent views have expanded the definition of coping to include a wider range of regulatory targets including the regulation of emotion components, namely, the emotional experience, cognition, behavior, and physiology (Compas et al., 2011). Consistent in both views, coping is characterized by the type of emotional response, coping process, and types of situations that necessitate regulation. Coping involves the regulation of a specific negative emotion (e.g., anger; Lazarus & Folkman, 1984), an unspecified negative state (e.g., stress; Gross, 2015) or a persistent negative mood (e.g., feeling depressed; Lazarus & Folkman, 1984). Coping is a goal-directed, volitional, and self-regulatory process and can occur in response to acute or chronic stressful situations, which can only moments or several years (Compas et al., 2014; Lazarus & Folkman, 1984). In both short-term and long-term coping episodes, this process involves "an unfolding, shifting pattern of cognitive appraisal and reappraisal, coping and emotional processes" (Lazarus & Folkman, 1984, p. 143).

As stated previously, emotion regulation involves influencing the trajectory of an emotional response (Gross, 2013). One of the defining features of emotion regulation involves the activation of a goal to regulate the emotional episode (Gross, Sheppes, & Urry, 2011). This process is thought to unfold temporally and can include antecedent-focused emotion regulation, which occurs prior to the generation of an emotion, and response-focused emotion regulation, which occurs in response to the emotion (Gross, 1998). These regulatory behaviors can target either positive or negative emotions in response to pleasant and unpleasant situations and circumstances. Emotion regulation is also thought to be controlled and automatic (Mauss, Bunge, & Gross, 2007) and can involve

internal and external regulatory processes, whereby individuals can regulate their own emotions or the emotions of others (Gross, 2015).

This brief overview of coping and emotion regulation highlights that there are some points of divergence between these two processes. In particular, coping includes only intrinsic efforts (i.e., regulating one's own emotions) to regulate stressful situations and the negative emotions caused by those situations, while emotion regulation also involves extrinsic efforts (i.e., regulating another's emotions) to regulate negative *and* positive emotion. In addition, coping can target acute and chronic stressors as well as negative moods, stress, and emotion, whereas emotion regulation involves the regulation of only emotion, which is generally evoked by an acute stimulus. Despite these differences, there remains substantial conceptual overlap between these processes which lends support to the perspective that emotion regulation and coping, although different, are similar processes (e.g., Compas et al., 2014; Gross, 1998, 2015).

Given the parallels between coping and emotion regulation traditions, calls have been made for greater integration between coping and emotion regulation traditions in other areas of psychology (e.g., Campos et al., 2004). Similarly, conceptualizations of the regulation of achievement emotion might also benefit from an integrative perspective of these regulatory processes because students are likely to regulate their positive and negative emotions in response to a variety of stressful and nonstressful achievement situations and outcomes. We suggest that for the regulation of achievement emotions, coping and emotion regulation might be functionally equivalent when regulatory efforts target a specific negative emotion, lead to the activation of a goal to decrease a negative emotion, and when regulatory efforts are volitional and self-directed. When these conditions are satisfied, coping and emotion regulation might represent analogous processes. Indeed, several authors have argued that under the right circumstances, many emotion regulation strategies and ways of coping serve identical functions (e.g., Aldao et al., 2010; Campos et al., 2004; Gross, 2015).

Current Frameworks of Emotion Regulation

In this section, we review three frameworks that can be used to inform why and how achievement emotions can be regulated, namely, the EPM (Gross, 2015), the CVT (Pekrun & Perry, 2014), and PARE model (Tyson, 2008; Tyson, Linnenbrink-Garcia, & Hill, 2009).

The EPM

While this framework is not specific to the regulation of achievement emotions, the processes of emotion regulation described in this model are applicable to the regulation of achievement emotions. The EPM of emotion regulation (Gross, 2015) is a recent extension of Gross's process model of emotion regulation (Gross, 1998). The original process model of emotion regulation is an information processing framework that views each stage of emotion generation as a potential target for regulation. Individuals can attempt to regulate emotion by selecting or modifying the situation (e.g., the achievement activity), directing attention within the situation (e.g., toward the achievement activity), changing how the situation is appraised (e.g., increasing subjective value of the achievement activity), or by modifying the emotional response (e.g., reducing the expression of frustration; Gross, 1998). These five general emotion regulation processes are discussed in more detail later. Emotion regulation is an iterative process, where emotional outcomes can serve as the starting point for the next iteration of emotion regulation. More recent versions of this framework have introduced feedback pathways to capture this characteristic of emotion regulation (e.g., Gross & Thompson, 2007). The EPM of emotion regulation is the most recent iteration of this model and has introduced the notion of valuation systems to address how emotion regulation strategies are implemented.

Valuation is a cyclical process and begins with an internal or external situation, a perception of the situation, valuation, and finally action. The valuation component involves the evaluation of the situation-individual interaction as indifferent, good, or bad, and the action component "involves resolving a gap between the perceived state of the world and the desired state of the world" (p. 10, Gross, 2015). The valuation cycle terminates when the discrepancy between an individual's goal and the world is resolved. The EMP proposes that emotions are generated by a first-level valuation system and emotions are regulated by a second-level valuation system, such that the second-level valuation system modifies the activity of the first valuation system (Gross, 2015).

Within the second-level valuation system, emotion regulation can be separated into three stages of emotion regulation (i.e., identification, selection, and implementation). Similar emotion regulation cycles have previously been proposed to explain emotion regulation flexibility (i.e., context-sensitivity, repertoire, feedback; Bonanno & Burton, 2013), emotion regulation action tendencies (i.e., identify the need for regulation, decide whether and how to regulate, enact a regulation strategy; Webb, Gallo, Miles, Gollwitzer, & Sheeran, 2012), and emotion regulation in models of self-regulation (i.e., monitoring, evaluation and goal setting; Ben-Eliyahu & Linnenbrink-Garcia, 2013; Koole, van Dillen, & Sheppes, 2011). While there are notable similarities and differences in the stages of emotion regulation proposed by each model, we will focus on the stages as outlined by the EPM of emotion regulation.

As in the first-level valuation system, the second-level valuation system also entails perception, valuation, and action. At the identification stage, an emotion generated by the first-level valuation system is perceived and evaluated. If the emotion is judged as significantly costly or advantageous, then a goal to regulate is activated. Emotional awareness is a key aspect of identifying which emotions warrant regulation and in what direction (i.e., up-regulate or down-regulate; Gross, 2015). At the selection stage, possible emotion regulation strategies are perceived and evaluated based on, for example, the availability of cognitive resources (Urry & Gross, 2010) and the strength of the emotion (Sheppes & Gross, 2011). This stage culminates in the selection of a general emotion regulation strategy. Finally, at the implementation stage, the general regulatory strategy is translated into a situation-specific tactic that is evaluated as appropriate for the particular context (Gross, 2015). All potential tactics are perceived, evaluated and subsequently implemented and, "it is only via the implementation of a regulation tactic that the first-level emotion-generative valuation system is regulated" (p. 15; Gross, 2015).

As mentioned previously, there are five general emotion regulation processes that can be implemented sequentially based on the

four phases of emotion generation (Gross, 1998, 2015). The second-level valuation system is involved in the implementation of a general emotion regulation processes. The first opportunity for emotion to be regulated is through situation selection, which involves approaching or avoiding a particular situation to control emotions. For example, a student who feels highly anxious about an upcoming test might choose to avoid the test altogether to reduce the feeling of anxiety. Once the situation is selected, then emotions can be regulated through situation modification, which encompasses behaviors intended to change the situation. For example, a student who feels frustrated when studying beside a talkative group of friends might modify the situation by listening to music. Within a given situation, emotions can be modified through attentional deployment by directing attention toward or away from specific aspects of the situation or through cognitive change by altering the meaning attached to characteristics of the situation. For example, a student feeling anxious during a test might direct their attention toward questions they can answer or reevaluate the importance of the test in the broader context of the course. Finally, emotions can be controlled through response modulation by increasing, decreasing or not changing response tendencies. For example, a student feeling anxious during a test might breathe deeply to modulate the physiological component of their emotional response.

Antecedents to Emotion Regulation

Several antecedent factors have been proposed that might influence emotion regulation efficacy at each phase of emotion regulation. We will focus the discussion on five of such factors, namely, emotion-outcome expectancies, motives, implicit theories of emotion, emotion regulation self-efficacy, emotion regulation competence, and context-specificity. While these antecedents are also applicable to the two frameworks described subsequently, we have chosen to discuss them in relation to the EMP because this is how the primary cited authors situated these factors.

Motives for emotion regulation and emotion-outcome expectancies are important factors during the implementation stage of emotion regulation. Motives in emotion regulation are the reasons why people want to regulate their emotions (Tamir, 2016), and emotion-outcomes expectancies are the beliefs people hold about the value of a specific emotion to attain a desired outcome (Tamir, Bigman, Rhodes, Salerno, & Schreier, 2015). The interplay between motives for emotion regulation and emotion-outcome expectancies are thought to shape the activation of a specific emotion regulation goal.

There are two broad types of emotion regulation motives: hedonic motives and instrumental motives (Tamir, 2016). Hedonic motives for emotion regulation follows the classical assumption that people will regulate their emotions in such a way to feel good and to avoid feeling bad (e.g., Larsen, 2000). Only recently have instrumental motives for emotion regulation been proposed (e.g., Tamir, 2009, 2016; Tamir et al., 2015; Tamir, Chui, & Gross, 2007). In this view, individuals are expected to prefer emotions that are perceived as useful, regardless of whether the emotion is pleasant or unpleasant (Tamir, 2016). The perception of utility depends on emotion–outcome expectancies (Tamir et al., 2015). For example, one study found that participants who believed that worry and fear were useful for avoiding threats upregulated this emotion even though worry and fear are considered unpleasant emotions (Tamir et al., 2007).

There are four subtypes of instrumental motives, performance (i.e., to do), epistemic (i.e., to know), social (i.e., to relate), and eudaimonic (i.e., to be; Tamir, 2016). In this review, we focus on performance motives for emotion regulation because these motives might have the most direct effect on the regulation of achievement emotions. Performance motives involve the motivation to experience emotions that lead to desired performance outcomes by shaping cognition and behavior. Performance motives can be further divided into cognitive motives, which involve the desire to experience emotions that alter cognition and behavior motives, which comprises of the desire to experience emotions that alter behavior in accordance with one's motive. Emotion–outcome expectancies are thought to determine which emotions will support particular performance motives. For example, if a student has the goal of doing well on an exam and believes that anxiety will help their performance by increasing their motivation to study, then they will want to increase or maintain a certain level of anxiety. However, another student who is also motivated to do well on the exam, but believes that anxiety will decrease their performance by reducing their ability to concentrate, will be motivated to decrease anxiety. Therefore, the belief that students have regarding the consequences of certain emotions and how they relate to their performance motives can shape the activation of specific emotion regulation goals.

Implicit theories of emotions might influence the selection stage of emotion regulation. Implicit theories are defined as the beliefs individuals hold about controllability and are thought to influence motivation to engage in self-regulation (Dweck, 1996). Implicit theories are domain specific and have traditionally been examined in relation to intelligence (e.g., Dweck, 1996, 1999); however, implicit theories have recently been explored in relative to emotion (De Castella, et al., 2013; Kappes & Schikowski, 2013; Kneeland, Nolen-Hoeksema, Dovidio, & Gruber, 2016; Mauss & Tamir, 2014; Romero, Master, Paunesku, Dweck, & Gross, 2014; Tamir, John, Srivastava, & Gross, 2007). As with implicit theories of intelligence, implicit theories of emotion can be divided into two types, entity and incremental theories (Tamir et al., 2007). Individuals who hold incremental beliefs view emotion as malleable and controllable and thus are more motivated to make flexible attempts to regulate their emotions, which increases the chances of successful regulation. Individuals who hold entity beliefs view emotions as fixed and impossible to control and therefore are less motivated to regulate emotion (Tamir et al., 2007). It has been suggested that implicit beliefs can influence not only an individual's effort to pursue an emotion regulation goal but also, the selection of specific emotion regulation strategies (Tamir et al., 2007). There is a growing body of empirical evidence that lends support to this claim. Specifically, individuals who endorse entity emotion beliefs are more likely to avoid undesirable situations (Kappes & Schikowski, 2013) or to simply accept their emotions (Kneeland et al., 2016). Whereas individuals who hold incremental emotion beliefs use more perspective taking (Kneeland et al., 2016) and cognitive reappraisal (De Castella, et al., 2013; Tamir et al., 2007). This pattern of findings suggests that entity theorists are less likely to engage in active emotion regulation when compared with implicit theorists. This too can extend to the regulation of achievement emotions whereby the beliefs that students hold re-

garding the malleability of emotions might shape how and to what extent they will engage in the regulation of achievement emotions.

Emotion regulation self-efficacy is a second factor that might influence the selection phase of emotion regulation. As stated previously, the selection phase is characterized by choosing a general emotion regulation strategy. Emotion regulation self-efficacy is the belief in one's ability to regulate emotion (Tamir et al., 2007). It has been suggested that these beliefs can be held in relation to emotion regulation in general (Tamir et al., 2007) or to a specific emotion regulation strategy (Gross, 2015; Goldin et al., 2012). It is expected that emotion regulation self-efficacy beliefs will influence how strongly individuals will attempt to regulate their emotions and which strategy they will activate. In addition, it has been suggested that it is unlikely that individuals will be able to successfully regulate their emotions when they do not feel capable of doing so (Caprara et al., 2008). Empirical works also support this claim where higher emotion regulation self-efficacy has been associated with more favorable emotion outcomes (e.g., Bandura et al., 2003; Goldin et al., 2012; Kirsch, Mearns, & Catanzaro, 1990). Therefore, it is possible that achievement emotion regulation self-efficacy might also influence students' emotion regulation decisions and efforts.

The implementation of a selected strategy is contingent on the individual's aptitude to translate the strategy into a specific tactic (Gross, 2015). Emotion regulation aptitude involves the ability to translate emotion regulation strategies into specific tactics, suitable for a given context. This includes representing available tactics and evaluating the appropriateness of the tactic relative to contextual variables. Individuals who lack emotion regulation aptitude might be more susceptible to regulation failure because they have less tactics in their repertoire or erroneously apply ineffective or maladaptive emotion regulation tactics. This ability might also be important for the regulation of achievement emotions because the tactics used to regulate these emotions in relation to the classroom, studying, and exams stand to differ. Therefore, it is possible that a student might be adept at regulating their studying related achievement emotions, but they might be less able to regulate their exam related achievement emotions.

The actions involved in the identification of an emotion to be regulated, the activation of an emotion regulation goal, the selection of an appropriate strategy, and the translation of the strategy into a suitable tactic, are all a function of the context in which individuals attempt to regulate their emotions. Borrowing an example from Webb, Miles, and Sheeran (2012), if a student is nervous about an upcoming exam, distracting themself for a few minutes by thinking about their upcoming vacation might help alleviate their anxiety. However, using distraction during the exam might interfere with doing well on the exam. Thus, the same strategy can be both adaptive and maladaptive depending on the context. Context-specificity is expected to influence each phase of emotion regulation by influencing the antecedent factors to regulation (Gross, 2015). Context might influence motives for regulation and emotion–outcome expectancies. For example, in an achievement setting students might be motivated to regulate their emotions based on a performance motive and the utility of a specific emotion might be evaluated differently depending on if it is a classroom, studying or exam situation. Context might also influence which general emotion regulation strategy a person will try to use (Gross, 2015), as well as which strategies are adaptive or maladaptive (Aldao, 2013; Gross, 2015; Troy, Schallcross, & Mauss, 2013). For example, when the controllability of a situation is high, cognitive reappraisal is adaptive strategy; however, when the controllability of a situation is low, cognitive reappraisal is a maladaptive strategy (Troy et al., 2013). Similarly, contextual variables might influence how individuals attempt to translate a general emotion regulation strategy into a situation-specific tactic, which could be more difficult in novel contexts (Gross, 2015). Accordingly, context plays a significant and often overlooked function in emotion regulation. The importance of context in emotion regulation decisions and efforts likely applies to the regulation of achievement emotions. For example, different strategies might be more or less adaptive during studying when compared with during exams because studying is potentially a more controllable situation than an exam.

The CVT

The CVT of achievement emotions is a second framework that addresses how achievement emotions can be regulated. While the emphasis of the CVT is on how achievement emotions are generated and their impact on student performance, we will focus on the regulatory aspects of this framework. According to their framework, achievement emotions are caused by proximal and distal antecedents (Pekrun, 2006). The most important proximal antecedents of achievement emotions are control and value appraisals. Control refers to subjective evaluations of control over the task and outcome (i.e., controllability and agency) and can be prospective (i.e., action-control and action-outcome expectancies) or retrospective (i.e., causal attributions; Pekrun, 2006; Pekrun & Perry, 2014). Value refers to subjective evaluations of intrinsic and extrinsic values of achievement activities and outcomes. The theory proposes that the combined function of control and value appraisals causes specific achievement emotions, which can be about outcomes (i.e., prospective or retrospective outcome emotions) or the activity (i.e., activity emotions). Over time, these cognitive appraisals can become automatic and the relationship between appraisals and emotion are no longer cognitively mediated (Pekrun & Perry, 2014). Distal antecedents include individual variables, such as goals and beliefs and situational variables, including features of the achievement task and environment. In general, CVT proposes that achievement emotions can be regulated by targeting both the proximal and distal antecedents to achievement emotions. This model proposes that there are four different strategies for regulating achievement emotions (Pekrun & Perry, 2014), which include situation-oriented regulation, appraisal-oriented regulation, emotion-oriented regulation, and competence oriented regulation. Situation-oriented regulation is described as selecting tasks and the environment to match individual goals and competencies. Appraisal-oriented regulation comprises of changing how the situation, task or environment is perceived. Emotion-oriented regulation consists of targeting the emotion by using relaxation techniques, taking drugs or using suppression. Finally, competence-oriented regulation involves targeting the achievement outcome by taking actions to improve competence.

The PARE Model

The PARE model is also describes the regulation of achievement emotions and was developed to explain the inconsistent

findings between performance-approach goals and academic outcomes (Tyson, 2008). While it is beyond the scope of this article to discuss various perspectives on achievement goals, we will briefly define the three types of achievement goals described in the PARE model (i.e., mastery, performance-approach and performance-avoidance). Students who endorse mastery goals are motivated to achieve by developing competence, students with performance-approach goals are focused on attainment and are motivated to demonstrate competence, and students with performance-avoidance goals, while also focused on attainment, are motivated to avoid incompetence (Elliot, 1997). The PARE model proposes that students who adopt certain achievement goals will be more or less likely to use adaptive and maladaptive patterns of emotion regulation in achievement contexts. In this model, the adaptiveness of an emotion regulation strategy was operationalized as strategies that positively influence behavioral and cognitive engagement, whereas maladaptive strategies hinder these processes (Tyson et al., 2009). The model gives particular focus to the regulation of debilitating emotions and broadly describes these as any emotion that "interfere[s] with task focus and undermine[s] task performance" (p. 334; Tyson et al., 2009). The model proposes that students with mastery approach goals are more likely to use adaptive emotion regulation strategies when they experience debilitating emotions, while students with performance-avoidance goals are more likely to use maladaptive emotion regulation strategies. Finally, students with performance-approach goals are thought to use either adaptive or maladaptive emotion regulation strategies. The model suggests that patterns of emotion regulation is a moderator between performance-approach goals and achievement.

A Framework for Emotion Regulation of Achievement Emotions

A framework for the regulation of achievement emotions must at least be able to address: (a) when, how, and why students regulate their achievement emotions, and (b) how regulatory processes influence learning and achievement. We argue that each of the previous frameworks can address some but not all of these criteria. Accordingly, the application of one of these frameworks alone is insufficient. For each of the current models, we will highlight a few of their limitations.

The context-generality of the process model of emotion regulation overlooks relevant contextual variables that are necessary to understand when, how, and why achievement emotions are regulated. The model does not address how emotion regulation influences learning and achievement or their correlates (e.g., cognition, motivation, and learning strategies) and instead emphasizes other outcomes (e.g., mental health). The model also cannot account for how students might regulate internal situations unique to achievement contexts, for example, perceptions of low competency. A student might feel anxious when preparing for an upcoming test because they does not think that they sufficiently understand the material. According to the EPM of emotion regulation, this student could regulate their anxiety by using attentional deployment, cognitive change or response modulation. However, as suggested by the CVT, this student could also try to alleviate their anxiety by changing the internal situation through competency improvement.

Achievement contexts are at the core of the CVT, and the framework suggests various ways students can regulate their emotions within these contexts; however, it does not provide sufficient detail concerning why students regulate their emotions. As previously discussed, there are several antecedent factors that influence each stage of emotion regulation including, emotion-outcome expectancies, motives, implicit theories of emotion, emotion regulation self-efficacy, and emotion regulation aptitude. These factors can help clarify when, how, and why students attempt to regulate their emotions in different achievement contexts. In addition, the CVT does not specifically address the role of attention in emotion generation and consequently does not consider potential attentional deployment strategies, as well as the consequence of these strategies on learning and achievement. In a similar vein, the framework alludes to the influence of emotion regulation on learning and achievement as mediated by achievement emotions; however, given the cognitive and behavioral aspects of emotion regulation, students' regulatory efforts and decisions might also directly influence learning and achievement or the correlates of learning and achievement.

The PARE model is also situated within achievement contexts and proposes how achievement goals can influence emotion regulation strategies; however, there remains several limitations. The PARE model does not conceptualize emotions as processes that unfold over time, and thus assumes that students can only regulate their emotions *after* the emotion has been experienced. In other words, this model is limited to explanations and predictions about the relationship between response-focused emotion regulation strategies and achievement goals. In addition, this model assumes that students who adopt mastery goals typically experience adaptive achievement emotions and if they experience maladaptive emotions they will rely on adaptive emotion regulation strategies, while students with performance goals might not. This assumption might be an over simplification of adaptive and maladaptive emotion regulation strategies and of the relationship between achievement goals and emotion regulation.

Taken together, this review has examined several important contributions and limitations of current emotion regulation frameworks for applications in achievement contexts. In an attempt to address these limitations, we propose a preliminary integrative framework of emotion regulation in achievement contexts (Figure 1). This framework builds on several assumptions from the foundational emotion regulation models described previously.

The framework is divided into five related components: (1) emotion generation, (2) emotion regulation strategies, (3) phases of emotion regulation, (4) antecedents to emotion regulation, and (5) outcomes. The first component describes the process by which emotions might be generated in achievement contexts. This component combines perspectives from the CVT theory and the modal model of emotion generation and describes the temporal sequence of emotion generation, namely situation, attention, appraisal, and response. The second component describes the general strategies that can be used to regulate achievement emotions at each stage of emotion generation. These general emotion regulation strategies are consistent with the EPM of emotion regulation and the CVT of achievement emotions. The third component describes the phases of emotion regulation including identification, selection and implementation. The fourth component describes the antecedents that might influence each phase of emotion regulation. The fifth component describes the correlates of learning and achievement (e.g., motivation) and outcomes. This component is conceptualized as a

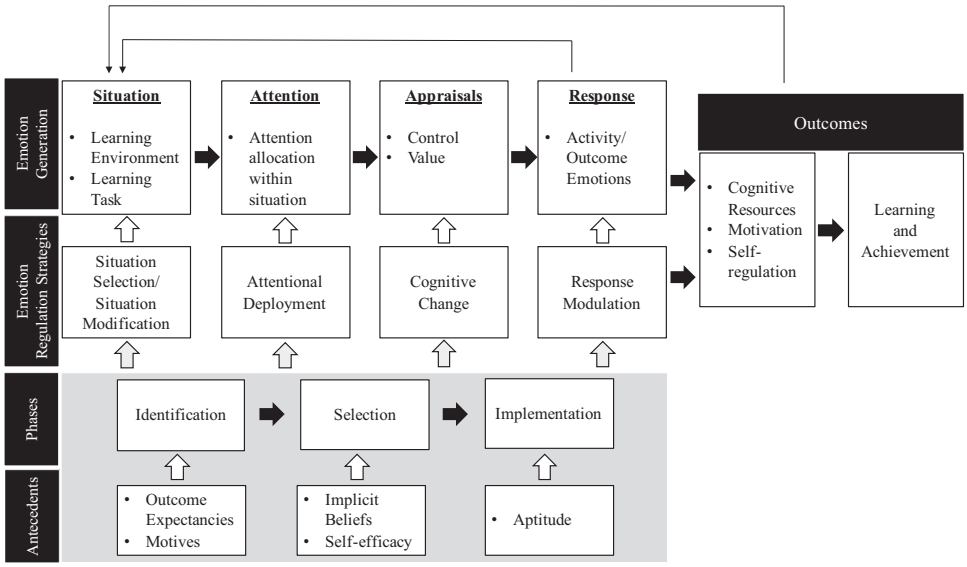

Figure 1. The regulation of achievement emotions.

consequence of emotional responses and emotion regulation, not as a component of these processes. It is acknowledged that outcomes might evoke a new situation, which can prompt a new cycle of emotion generation and regulation. The relationship between the five components are based on a set of basic assumptions. The first basic assumption is that *achievement emotions are generated temporally following the process of situation, attention, appraisal, and response.* The second basic assumption is that *emotion regulation strategies influence the process of emotion generation.* This framework assumes that emotion regulation strategies influence the generation of specific achievement emotions by shaping the situation (i.e., learning environments and tasks), attention within the situation, appraisal processes (i.e., control and value), and modulation of emotional responses. The third basic assumption is that *antecedent factors influence the identification, selection, and implementation of emotion regulation strategies*. This framework incorporates the five factors discussed previously, namely, emotion outcome-expectancies, motives for regulation, implicit beliefs about emotion, emotion regulation self-efficacy, and emotion regulation aptitude. These factors subsequently influence the phases of emotion regulation (e.g., identification) at every stage of emotion regulation (e.g., situation selection). The fourth basic assumption is that *achievement emotions and emotion regulation strategies influence learning and achievement outcomes by shaping the correlates of achievement*. Consistent with the PARE model, it is expected that certain emotion regulation strategies will help or hinder learning and achievement. This framework assumes that emotion regulation can directly or indirectly influence the correlates of achievement and achievement outcomes. Consistent with several of the assumptions presented in the CVT, this framework also acknowledges that achievement emotions can directly shape the correlates of achievement. The fifth basic assumption is that *the achievement context influences each component of this framework.* It is expected that the unique situational features of different achievement contexts will directly influence the emotion generation and emotion regulation cycles and thus shape learning and achievement outcomes.

Conclusion

The purpose of this article was to review the conceptualization, process, and consequences of the regulation of achievement emotions. As such, we discussed several emotion theories and emotion regulation models that can be used to inform our understanding of achievement emotion regulation. Based on this review, we proposed a preliminary framework that describes the regulation of achievement emotions by integrating and extending current emotion regulation models. We recognize that this framework is not without limitations. For example, the framework does not address how previous achievement outcomes might influence the antecedent to emotion regulation (e.g., How do prior achievement outcomes shape emotion-outcome expectancies?). This framework also does not address how individual differences might shape emotion regulation (e.g., How does gender influence emotion regulation strategy selection?). Despite these limitations, this framework provides a novel foundation from which future research can build upon by testing the assumptions proposed in this framework and by expanding on this framework. For example, future work can investigate the relationships between the antecedents, process, and consequences of achievement emotion regulation. Such empirical investigations will help inform targeted emotion regulation skill development and interventions that are suitable for particular achievement contexts. Equipping students with the necessary skills to effectively and adaptively control their emotions is important because achievement emotions can help and hinder student learning and achievement. This preliminary framework in combination with the broader review can facilitate research, theory, and practice aiming to support student learning and achievement.

Résumé

Le présent article propose une analyse critique de plusieurs théories influentes sur les émotions et les modèles de régulation des émotions relativement à leur utilité pour expliquer comment,

quand et pourquoi les élèves régissent leurs émotions en lien avec l'accomplissement. En fonction de cette analyse, nous proposons un cadre novateur pour la régulation des émotions en lien avec l'accomplissement. Ce cadre part du principe que l'apprentissage et la réussite des élèves sont influencés par les émotions en lien avec l'accomplissement et les efforts déployés pour réguler des émotions. Le cadre propose en outre que les décisions en lien avec la régulation des émotions, notamment l'identification, la sélection et la mise en œuvre de stratégies de régulation, sont façonnées par cinq antécédents : les résultats escomptés des émotions, les motifs de régulation des émotions, les croyances implicites au sujet des émotions, l'auto-efficacité de la régulation des émotions et l'aptitude à réguler ses émotions. Les incidences théoriques et pratiques de ce cadre sont évoquées.

Mots-clés : émotions en lien avec l'accomplissement, émotions, régulation des émotions, apprentissage, réussite scolaire.

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Received February 24, 2017
Revision received May 15, 2017
Accepted May 17, 2017 ■